ATTITUDES TOWARD LEFT-HANDEDNESS

BY

ZETHA RAE SCHEYTT

Submitted in partial fulfillment of the requirements
for the Master of Education degree
in the School of Education
Montana State University
June, 1969

ACKNOWLEDGEMENT

Cooperation and assistance from a number of individuals has made the completion of this study possible. The author wishes to express her appreciation to Drs. Elnora Wright and Willis Vandiver for their guidance and critical reading of this paper.

The author wishes to thank the city school superintendent, curriculum coordinator, and elementary school principals for their assistance in this study and the teachers and parents of left-handed children for the time and thought they have given to filling out the questionnaire.

Sincere appreciation is expressed to my parents for their patience, understanding, and encouragement as the parents of a left-handed child.

TABLE OF CONTENTS

Chapter		Page
I.	INTRODUCTION	1
	Purpose of Study	2
	Procedure of the Study	3
	Limitations	3
	Summary	4
II.	REVIEW OF LITERATURE	5
	Definition of Terms	5
	Eye-Hand Preference and Speech	6
	Eye-Hand Preference and Reading	13
	Hand Preference and Handwriting	21
	Determining Handedness	25
III.	METHODS OF PROCEDURE	30
	ANALYSIS OF DATA	30
IV.	SUMMARY, CONCLUSIONS, RECOMMENDATIONS	44
	Summary	44
	Conclusions	45
	Recommendations	47
	APPENDIX	50
	Samples of Questionnaires	51
	LITERATURE CITED	58

LIST OF TABLES

Number		Page
I.	Number and Per Cent of Parents Responding to Questions on Attitudes Toward the Left-Handed Child	31
II.	Number and Per Cent of Teachers Responding to Questions on Attitudes Toward Left-Handedness	34
III.	Number and Per Cent of Differences of Teachers and Parents Responding to Questions on Attitudes Toward the Left-Handed Child	38
IV.	Number and Per Cent of Teachers Responding to Questions on Techniques of Teaching Left-Handed Children to Write .	40

ABSTRACT

The purpose of this study was to determine the attitudes of teachers and parents toward the left-handed child.

Questionnaires to the parents of left-handed children and teachers were used for the collection of the data. The faculty members in grades one through six in the Bozeman City Schools returned 66 of the 72 questionnaires distributed. There were 144 of the 180 parent's questionnaires returned. Comments and suggestions were requested. The data obtained were tabulated for study and comparisons.

Conclusions arrived at as a result of this study were:

1. Traditional prejudice against the left-handed child by parents and teachers is minimal, if any exists.
2. Parents and teachers do not practice or recommend the policy of shifting a left-handed child to the right hand.
3. The majority of parents and teachers have no preference as to right or left-handed children in the home or at school.
4. The majority of parents and teachers believed the left-handed child could solve his own problems of left-handedness without their help.
5. Motor skill ability and awkwardness were not considered to be a result of left-handedness by the majority of parents.
6. Apathy for the left-hander was minimal as indicated by the parent questionnaire.
7. Several parents and teachers indicated the left-hander would be confronted with more problems than a right-hander in a right-handed world.
8. The majority of faculty felt competent instructing left-handers in handwriting.
9. There was a trend to allow the left-hander to choose a technique or method comfortable for him.

A study dealing directly with the left-handed child was recommended to determine the self-perception of attitudes and possible problems encountered by the left-handed child.

Recommendations were compiled for the teachers on instructing a left-handed child to write. It was concluded that disadvantages of left-handedness can be reduced considerably through proper guidance.

CHAPTER I

INTRODUCTION

Prejudice against left-handedness has persisted since earliest times. The word "left" is of Anglo-Saxon origin meaning originally "weak" or "broken." Webster in defining "left-handed," includes the term "clumsy, awkward, insincere, and dubious." The word "sinister" with its unsavory implications is of Latin origin meaning "left." The French terms "gauche" meaning "left" and "gaucherie" have come to mean "clumsy."

Prejudices in past eras have gone so far as to suggest that left-handedness is immoral or abnormal. The Hexe in Germanic mythology made the sign of the Cross with the left-hand, according to old German tradition. In the seventeenth century, left-hand has been called the sick hand, and Lord Chesterfield warned against left-handed behavior. Left-handedness was held to be a mark of ignominy and disgrace. The left-handedness was observed to be associated with other bodily and mental defects (Hildreth, 1949).

Traditionally, the right-hand has been regarded as the preferred hand. As Hildreth explains:

> Right-handedness is a cultural and social convention to which most people are trained and find it expedient to conform.... In an unbiased world, left-handedness would be as common as right-handedness, for the play of chance factors would be equal for the two sides (1949).

But this is not an unbiased world. Methods of teaching are geared to the right-handed. In learning to write, left-handed pupils must adapt the right-handed model to fit their left-hand imitations, unless the teacher is able to demonstrate how to write with the left-hand (Smith, 1959). Designs of equipment and demonstrations of the method of using equipment

are generally given for the benefit of people who are right-handed (Jersild, 1960).

The writer recognized that the left-handed child is under many disadvantages in a right-handed culture. This idea has been substantiated by an authority, A. C. Jersild, who maintains:

> The hardship a child must bear because of being left-handed may be very light, yet there is bound to be at least some hardship connected with being a left-hander. A person cannot differ from most other people without having to pay at least a small price for such a difference. Handedness as such is likely to have a small impact on the child's personality and his view of himself if other circumstances in his life and in his relationship with others are favorable (1960).

Other authorities recognize the left-hander's problems with greater concern:

> When the left-hander joins the great competition which is life, he is confronted with a double task; (1) that of learning the same skills and information as the right-hand child; and (2) the additional task of overcoming handicaps. This second task either sets him in a position of relative inferiority at the start or requires of him a greater amount of ability and energy (Dayhaw, 1953).

The importance of the problem and the price paid by individuals led to the desire on the part of the writer to promote recognition of attitudes toward the left-hander's problems. By arousing awareness of the attitudes toward left-handed people and problems encountered by them, it is hoped that society will become more helpful in establishing a beneficial goal for them.

PURPOSE OF STUDY

The purpose of this study was to determine the attitudes of parents and teachers toward the left-handed child. The writer has felt that any

person interested in the education of youth should have a better understanding of the left-handers' problems. A study of the attitudes would give a deeper insight and understanding which would be of assistance to all teachers.

PROCEDURE OF THE STUDY

The intention of the writer was not to change attitudes or opinions regarding the left-hander, but rather, to document the attitudes toward the left-handers' problems. To carry out this objective the following procedures were used:

1. A survey of literature was completed to determine the problems of the left-hander as expressed by various authors.
2. Questionnaires were sent to the left-handers' parents and teachers of grades one through six in the Bozeman Elementary Schools to determine their attitudes toward the left-handed. For the purpose of this study, handedness was determined by the left-handed or right-handed consistency in writing.
3. Results of the questionnaires were then analyzed for the differences or similarities of attitudes among the parents and teachers. Recommendations of data obtained were made for the teachers.

LIMITATIONS

The writer has placed limitations on certain phases of this study. Questionnaires were limited to the parents and teachers of the left-handed children in grades one through six in the Bozeman Elementary Schools. It

was recognized that considerable self appraisal and prejudicial perception would enter into a study of this kind. Results of the study were confined to the questionnaires used in the study.

SUMMARY

Prejudice against left-handedness seems to have existed since early times. The writer recognized that right-handedness is emphasized in our culture. As a result, the left-hander encounters many disadvantages. These disadvantages are influenced by the attitudes of parents and teachers. The purpose of this study was to identify these attitudes by questionnaires. Recommendations for teachers were drawn from the data received.

Chapter II

REVIEW OF LITERATURE

There has been a notion, more or less popular, that a relationship exists between left-handedness and speech, reading and writing disabilities. In this section, the writer shall try to define each problem and present sample studies some of which affirm and others which deny any important relationship between these factors. The whole question is far from settled. The crucial experiments undoubtedly have not yet been done.

DEFINITION OF TERMS

A listing of terms and their definitions as they relate to laterality patterns are listed below. The terms and operational definitions are taken from Harris (1958).

Lateral dominance: refers to the preference or superiority of one side of the body over the other (hand, eye, foot) in performing motor tasks. Right lateral dominance would indicate preference for the right hand, eye, and foot.

Laterality: is another term for lateral dominance.

Consistent dominance: refers to the preferential use of one hand, eye, or foot.

Mixed or incomplete dominance: exists when the individual does not show a consistent preference for one eye, hand, or foot.

Crossed dominance: exists when the dominant hand and dominant eye are on opposite sides.

Directional confusion: refers to knowledge of left and right.

EYE-HAND PREFERENCE AND SPEECH

The relationship between left-handedness and speech defects has been debated for some time. In the minds of some people this relationship is a very simple one. It may be either that left-handedness itself is an abnormality, one manifestation of which is stuttering, or that stuttering or some other speech disorder may result when a naturally left-handed child is required to give preference to the right hand. However, the relationship, if any, between left-handedness and disorders of speech is undoubtedly a complex one if for no other reason than that both handedness and speech defects are extremely complex reactions of the organism (Travis, 1931).

Travis and associates (1935) share the premise that beginning stuttering is associated with the theory of cerebral dominance.

> The muscles of the speech organs are paired with nerve fibres running to opposite sides of the brain. The entire central nervous system functions under a dominant gradient located in the left-hemisphere for right-handed people, the reverse for left-handed.

The theory would not only explain stuttering, but the linkage between disturbances in hand and eye dominance and stuttering as well, according to its proponents.

Chesher's study of 157 patients (1936) supports the view that the language mechanism resides in only one cortical hemisphere, the hemisphere on the side opposite that of the preferred hand. In patients with mixed hand dominance, this relation does not prevail. In these cases the language mechanism is unlateralized in the cerebrum.

More moderate positions are taken by Penfield and Rassmussen (1955) and Grinker and Bucy (1951). These workers hold that speech may be represented in either the left or right hemisphere in left-handed persons.

Brain (1945) believes the dominance of one hemisphere to be a precondition of symbolic thinking and expression. Studies of brain lesions and resulting aphasia would tend to lend support to this view but the cases are not numerous and the cases reported tend to be adult subjects with hand and speech habits well established (Hildreth, 1950).

Much research has pointed out the effect on speech of a shift of handedness or of confused sidedness or laterality. The speech disorders usually so affected are stuttering and delayed speech. The following studies contain affirmative conclusions from research investigation of the relationship between handedness and stuttering.

Ballard (1912) made two investigations and found that stuttering did not appear in cases where no attempt was made to change established hand usage. The author's conclusion is that there is a connection between handedness and motor mechanism of speech, a disturbance in the first causing a disturbance in the latter. He believes, however, that whether any correlation is found between stammering and handedness depends on the age level, the ability of the individuals studied, and many other factors.

In a questionnaire study of handedness, Downey (1927) found that sinistral tendencies, either dominance of the left eye or a complete or partial dominance of the left-hand in bimanual activities, characterized

all but a small percentage of the cases with speech difficulties.

Ojemann (1931) studied the effect upon speech of having left-handed individuals write with the right-hand. This study supports the view that there is some connection between a handedness shift and stuttering, for 25 per cent of his dextro-sinistrals, as against one percent of a general population, had experienced a speech disturbance.

Bryngelson and Rutherford (1937) found four times as much ambidexterity and about eight times as much shifting of handedness among stutterers as the control cases in their study.

The right-handed children studied by Burt (1937) had 1.7 per cent who showed any tendency to stammer; among the left-handed, 6.5 per cent. Among the left-handed 11.9 percent were reported to have stammered or stuttered in the past; in the right-handed 3.2 per cent. In another study 9.1 per cent of left-handed children showed some defect of speech at the time and 15.4 per cent or nearly twice as many had stammered or stuttered in the past. No problem of stuttering arose when children who were left-handed learned to do woodwork and other forms of hand work with the right-hand predominating, when they were trained along with a group of right-handed children. The trouble seems to be related primarily to learning to write.

Daniel's (1940) subjects were 1,594 students at Syracuse University. Stuttering proved to be twice as common among the left-handed and ambidextrous students as among the right-handers. The proportions of stutterers in each group were: left-handed 2.9; ambidextrous, 2.9; right-handers, 1.1.

Gates (1929) found a higher percentage of speech defects among left-handed than among right-handed boys in the ratio of four to one. Gates believes the "changing over" of established dominance definitely increased the stuttering tendency.

In a survey of over 89,000 school children, Wallin (1916) found 1844 were left-handed children taught to write with the right-hand. Of these dextro-sinistrals 9.4 per cent had acquired some speech defect. The proportion of speech defect in the left-hand was nearly double that for children in general.

A summary of the research data on the relationship of handedness and stuttering, and a discussion of four questions concerning that problem, by Travis and Johnson (1934) concluded that:

1. Change of handedness occurs with significant frequency in stuttering history.
2. Stutterers show greater laterality and ambilaterality than normals.
3. There is more left-handedness in the heredity of stutterers.
4. The cerebral organization in stutterers is characterized by high ambilaterality.

A number of investigations have been made concerning certain aspects of the family background of stutterers. The studies by Milisen and Johnson (1936), Wepman, (1935) and West and Berry (1939) are representative. They indicate that stutterers have more left-handed and stuttering relatives than nonstutterers.

An investigation by Beckey (1942) involved detailed clinical study of 50 children who were delayed in the onset of speech with 50 who talked at the normal age. Factors in the family stock which were found to be associated with delayed onset of speech were speech defects and left-handedness.

Johnson (1955) studied parental attitudes and adjustments to stuttering. No significant differences were found between mothers and fathers with regard to their own handedness, their opinions of left-handedness, their acceptance of the child's preferred handedness, and of the relationship between handedness and stuttering.

Laterality was studied in relation to articulation by Johnson and House (1937) who compared articulatory defective children with normal speakers on tests of ocular and hand dominance. Their conclusion was that handedness, as measured, tends to be related to severe functional articulatory defects but that the findings with regard to eyedness were not significant. In opposition to these results, Everhart (1953) found no significant relationship between articulatory defectiveness and handedness in children in grades one through six.

There appeared to be no significant relationship between handedness and speech defects in the following studies.

Johnson (1955) investigated 46 children who had been labeled as stutterers shortly after reported onset of the difficulty. Interviews were carried out with each set of parents, supplemented by observations of the children. Data for these children were compared with data

obtained by interviewing the mothers of 46 nonstuttering children matched approximately with the stuttering children for chronological age, sex, and intelligence. There appeared to be no important differences between the groups with regard to handedness. Moreover, changes in speech observed during the study did not appear related in any important manner to changes in handedness, or absence of such changes.

Parson (1924) investigated 15,000 pupils to find that in the four years that the policy of training all left-handed pupils to write with the right hand had been in effect not a single case of defective speech could be traced to the reversal of manual habit. He believed that whenever stuttering occurred as a result of changing the native handedness of young children it lasted only while the change was being made.

Morsh (1930) demonstrated that it is possible to teach a left-handed child to use his right-hand with only good results. He concludes:

> At no time was any stuttering or stammering detected, proving quite conclusively that in some cases manual activities may be learned by the non-preferred hand without causing an emotional upset and consequent speech defects.

Writing and laterality characteristics of stuttering children were studied by Spadino (1941). Seventy stutterers were matched with 70 nonstuttering children in age, grade, sex, and linguistic or racial background. Tests were given in handwriting skill and composition, intentional mirror writing, bimanual simultaneous drawing and laterality, mirror reading, orientation, and perception. No significant differences were found between the stutterers and the control group on any of the tests.

In Gottlober's opinion, (1935) shifting of handedness in itself does not cause sufficient neurological changes to disorganize the normal functionings of central nervous system to the extent of causing blocking. It is the continuous emotional trauma the child suffers in the process of having his handedness shifted that is the cause of the excessive repetitions and hesitations in the speech act.

Fletcher (1928) does not accept the change from left to right handedness as a cause of stuttering. He holds a feeling of social inferiority to be primarily responsible. This fear reaction always occurs in a social situation with the speaker at the center, and is in a sense an anticipation of failure. He shows that a stutterer removed from his listeners can usually speak or read to himself without difficulty. This is taken to be a refutation of the cerebral dominance theory, for it becomes difficult to explain why unilateral dominance can be maintained except in social situations (Stoddard, 1934).

Van Riper (1947) reviewed the research on stuttering and concluded:

> Although more research has been carried out on stuttering than on any other speech disorder, speech correctionists have failed to agree on any one explanation of its nature and its cause. The reasons for this lack of agreement have been the complexity of the disorder and the difficulty experienced by experimenters in controlling all of the many physiological and psychological factors which affects its frequency, form, and duration.

The question of a relationship between left-handedness and disorders of speech is far from being definitely answered in either the affirmative or the negative. The results of early studies seem to indicate that speech defects, especially stuttering, are more numerous

among left-handed children. Change of handedness occurs with significant frequency in stuttering history. Investigations indicate there is more left-handedness in the heredity of stutterers. The relationship between sinistrality and ambiliterality and speech disorders is undoubtedly not a simple one. Much further careful work is necessary before we can say definitely just what relationship, if any, exists.

EYE-HAND PREFERENCE AND READING

The subject of laterality and its relationship to reading disability has long been of interest to researchers. Some writers have investigated the hypothesis that left-handed children tend to make more reversals in reading than right-handed children. Others have studied eyedness alone, while yet other writers have investigated the problem of the relationship between eyedness and handedness considered together to reversals in reading and to reading disability. It has been felt that the child showing crossed laterality or inconsistent hand and eye preference may encounter difficulty with eye-hand coordination tasks necessary for reading. Some researchers feel that lack of unilateral eye-hand preference may reflect mild neurological dysfunction of some sort (Weintraub, 1968).

Orton proposed a cerebral-dominance theory of laterality in relation to difficulty in learning to read. In this theory, learning to read involves selecting the memory images, or traces of letters and words of one hemisphere of the brain, the dominant hemisphere, over the other hemisphere. If such dominance is well established on one side, usually manifested by strong right-handedness, or one handedness, the child should

among left-handed children. Change of handedness occurs with significant frequency in stuttering history. Investigations indicate there is more left-handedness in the heredity of stutterers. The relationship between sinistrality and ambiliterality and speech disorders is undoubtedly not a simple one. Much further careful work is necessary before we can say definitely just what relationship, if any, exists.

EYE-HAND PREFERENCE AND READING

The subject of laterality and its relationship to reading disability has long been of interest to researchers. Some writers have investigated the hypothesis that left-handed children tend to make more reversals in reading than right-handed children. Others have studied eyedness alone, while yet other writers have investigated the problem of the relationship between eyedness and handedness considered together to reversals in reading and to reading disability. It has been felt that the child showing crossed laterality or inconsistent hand and eye preference may encounter difficulty with eye-hand coordination tasks necessary for reading. Some researchers feel that lack of unilateral eye-hand preference may reflect mild neurological dysfunction of some sort (Weintraub, 1968).

Orton proposed a cerebral-dominance theory of laterality in relation to difficulty in learning to read. In this theory, learning to read involves selecting the memory images, or traces of letters and words of one hemisphere of the brain, the dominant hemisphere, over the other hemisphere. If such dominance is well established on one side, usually manifested by strong right-handedness, or one handedness, the child should

have no difficulty in learning to read. But if the child has not developed either right or left dominance at the time he begins to read, difficulties will occur. Confusion appears, manifested, for example in tendencies to mirror writing, in mirror reversals of words and letters, and in difficulty in associating these reversed shapes with the straightforward printed phonetic elements. Training to establish lateral dominance and in proper orientation in perceiving letters and words is prescribed (Tiner, McCullough, 1962).

Orton's theory has been brought up to date and emphasized in a recent book by Delacato (1963). Emphasis by Delacato is placed on attainment of developmental stages in neurological maturity and ascribes importance to immature patterns of movement and posture which are attributable to the medulla and spinal cord, the pons, the mid-brain, and cerebral cortex. Of those at the cortical level, failure to achieve clear dominance of one cerebral hemisphere over the other is considered to be the basic cause of reading disability. Major emphasis in treatment is on promoting neurological organization and hemisphere dominance (Harris, 1963).

There is widespread skepticism about Delacato's ideas among psychologists and neurologists. There are as yet only two independent published reports of research using the Delacato procedures, both by Robbins (1965-1966). Neither demonstrated superior results, either with second-grade pupils or with retarded readers (Harris, 1968).

Money (1966) found many problems with Orton's theory.

> It is clear that the attempt to relate reading disability to cerebral dominance should not be in terms of a theory of simple hemispheric rivalry or mixed dominance. It makes more sense to see the issue as one of the relationships between unilateral versus bilateral representation of functions related to language in its many facets.

A second dominance theory was promulgated by Dearborn (1935). The way in which left-handedness may possibly operate as an initial handicap in reading is suggested by the following observation.

> The outgoing movement of the left-hand is from the center of the body toward the left. The left-hand person, possibly because he watches what his preferred hand does and thus establishes the habit may show a preference for this same direction in his eye movements. The reading of "saw" as "was" is a very commonly observed error although it is by no means confined to the left-handed reader.... The confusion of letters which are the same in form but different in position such as p, q; d, b; n, w has been explained as due to the fact that our earliest memories of the letters may be muscular. The eye movements of the letters may be quite as important as hand movements in fixing these memories.

To summarize the findings on the relationship between hand and eye preference and reading disability, Monroe (1967) pointed out the following trends: There is a significantly greater incidence of left-eye preference and of left-eye preference with the right-hand preference among the reading-defect cases than among the controls. Left-eye preference, is associated with fluent mirror-reading. There is a slight tendency for left-eye preference to be associated with reversal errors in reading. Reading defect cases report a larger incidence of changed handedness, and left-handedness among members of the immediate family than do the controls.

Muehl (1963) found that left lateral subjects made more left and right recognition errors than consistent right lateral subjects. He felt that left laterality in pre-readers might be "associated with

unique patterns of visual or perceptual behavior." The results also showed a tendency for a greater proportion of boys than girls to be left lateral. Muehl suggested the possibility of a sex-linked relation between early left laterality and subsequent reading achievement due to retarded perceptual behavior.

Harris (1957) noted that the ability to distinguish between right and left and the establishment of a clear preference for one hand developed more slowly in the clinic cases than in his group of unselected children. He posited there might be a special maturational slowness, perhaps neurological in nature in the clinic cases.

A number of relatively recent studies, however, have been unable to discover any relation between lack of lateral dominance and difficulty in learning to read.

Comparisons by Stephens, Cunningham, and Stigler (1967) were made of reading readiness test results for 89 first grade children. Comparisons on the basis of sex and of eye and preference patterns yielded no significant differences in levels of reading readiness. Findings suggest that minimal brain dysfunction theories may be unsuitable for explaining reading disability.

Stevenson and Robinson (1953) followed gifted kindergarten children for approximately two years to note whether pupils with inconsistent eye-hand preference made slower progress and exhibited more difficulty in learning to read than did pupils with consistent eye-hand preference. In addition to preference tests, measures designed to identify reversal

tendencies, to note preference for direction, to arrange pictures in sequence and to note the direction in which a child drew lines on a blank sheet of paper were given. The only significant difference appearing prior to reading instruction occurred in the direction for placing pictures. The group preferring right-hand and left-eye tended to place the pictures from right to left. By the end of grade one, pupils who were confused in this type of directional tendency prior to reading instruction had developed the left to right approach to reading and applied it automatically to picture direction. The authors point out as one of the implications of the study, the need to provide left to right directional instruction to pupils, especially to those who tend to prefer their right-hand and left-eye. When such instruction is provided, it appears that bright children who are confused in directional tendency have little or no difficulty in developing proper directionality for reading.

Smith (1950) studied male retarded readers and male reading achievers ages nine to eleven. On tests of hand, eye, foot and ear preference, no significant differences were found between retarded readers and reading achievers.

Mirror drawing finding revealed no significant difference between the two groups. The proportion of retarded readers making some reversals was almost four times greater than the proportion of achievers exhibiting reversals in this area.

Schubert (1957) reports that the ability to note similarities and differences is closely related to general intelligence.

> This is one reason why we find a strong relationship between making of reversals and mental age. It isn't at all unusual to find great numbers of young children, particularly in first grade, making reversals. It is ridiculous to assume that these reversals are manifestations of confused dominance conditions. With additional mental maturity, the vast majority of these children no longer show reversal tendencies.

Several recent studies support this view.

Kennedy (1954) studied reversal tendencies among pupils from kindergarten to high second grade. She found that "the occurrence of reversal errors of all types studied are perfectly normal in the earliest grades," and "it is equally normal for them practically to disappear as the child progresses through the first several grades."

In support of Kennedy's finding, Edfeldt (1955) of the University of Stockholm, concluded his study by saying, "The reversal tendency occurs commonly during the kindergarten age, during which it gradually disappears," and "reversal tendency normally seems to have vanished by the ages of eight and one-half to nine years."

Witty and Kopel (1936) selected the one hundred poorest readers in grades three to six and compared them with a group of good readers. Various phases of laterality were measured. Results indicated that the reversals appeared to be merely symptoms of poor reading. Left-handedness, left-eyedness, and various other conditions of hand and eye dominance were found to be unrelated to reversal tendency.

Sixty-seven disabled readers in grades two, four, and six were identified by Tinker (1965) and each was matched with a normal reader of the same sex, grade, and I.Q. Foot, hand and eye preference tests, and

two measures of reversal tendency were administered to both groups. When the data were analyzed, the author concluded that they did not support the view that laterality is a factor in reading disability.

The issue of eye-hand preference patterns in relation to reading achievement reveals little evidence of reading difficulty. In an early study including first grade children as well as slightly older retarded and normal readers, Gates and Bond (1936) found that their data showed no consistent tendency for eye-preference, single-eye superiority in acuity, hand preference, or any combination of these, to be related to achievement in reading, word pronunciation, reversal errors, or visual perception of various items.

Stephens (1967) grouped beginning readers according to eye-hand preference patterns and studied the readiness scores for differences in achievement. Results showed that subjects with crossed eye-hand preference had no greater difficulty with reading readiness measures than did children exhibiting unilateral eye hand preference.

Other investigators studying first grade children but using different measures of laterality have reported similar results. Balow (1962) individually tested grade one children in thirteen randomly selected classrooms using the Harris Test of Lateral Dominance. Subjects were classified according to hand and eye preference as either right dominant, left dominant or mixed dominant and were tested for reading ability. Results showed that hand preference and eye preference, singly or in interaction, were not significantly associated with readiness or with

reading achievement. When subjects were classified according to preference and to knowledge of right and left, reading achievement was not found to be significantly related to any of these factors.

Balow and Balow (1964) followed some of these same children into grade two. The Harris tests were re-administered to those children who had not established consistent directional preference in grade one. Again, no significant relationship between reading achievement and hand-eye preference was revealed. Neither was strength or direction of hand preferences significantly associated with reading achievement. The findings led the authors to conclude that the establishment of consistent hand dominance prior to grade one, during grade one or grade two, or not at all, is not significantly related to reading achievement in grade two.

The issue of eye-hand preference and its relationship to reading disability is still confused. Part of this confusion is the result of the instruments used to measure laterality. Different investigators have used different measures. Oftentimes the reliability of these measures is questionable. Equally important is the fact that some of the texts may be measuring a learned preference whereas others may be measures of unlearned preference. Several trends, however, do emerge from the confusion:

1. Neurological implications of laterality patterns are not clear. Certain handedness or eye-hand patterns may be the result of mild neurological impairment. Evidence for or against such a conclusion must await the development of better instruments and of more carefully controlled studies.

2. In both unselected and clinic populations, hand preference becomes better established with age; as the child becomes older he appears to move toward a preferred hand and away from an inconsistent pattern.
3. To date, evidence collected with unselected populations shows little if any relationship between laterality and reading achievement.

Since there is no agreement in this area, we must consider dominance as just one of the possible causes of reading disability.

HAND PREFERENCE AND HANDWRITING

One major form of individual differences related to handwriting is left-handedness. One researcher (Carrother, 1947) revealed that 8.2 percent of the quarter million secondary school pupils checked were left-handed. This approximates the round numbers given by such writers as Cole (1946) who cites the figure 10 per cent.

Studies seem to indicate that on the average two or three pupils in an elementary school classroom can be expected to have a preference for the left-hand over the right. The question as to how to teach the left-handed child to write is a problem of every teacher. The left-handed child should not be simply put on his own to figure out the intricacies of handwriting; neither should he be considered a "problem child." He is a normal individual who needs the same attention, help, and encouragement as the right-handed child (Burns, 1963).

The teacher must completely accept the handedness of each pupil so that there are no feelings of uncertainty or antagonism. The teaching procedures are of less importance than the proper attitude on the part of the teacher and the pupil. "It is not sinistrality that causes trouble, but sinistrality plus training in right-handed methods" (Burns, 1963).

There is no question that writing presents special difficulty for left-handers. Before guidance can be given the difficulty must be recognized by the teacher and parents and understood as much as possible.

There is no "natural" orientation in writing, to right or left, up or down the page. The orientation from left to right is learned and taught. Most children learn this orientation more or less incidentally from watching the teacher at the blackboard or seeing other persons write (Hildreth, 1950). Some confusion in direction is natural. Prolonged confusion, however, is likely to mean confusion about general direction, and this is often related to cerebral dominance.

Breckenridge (1949) indicated that:

> Naturally left-handed children find movement from right to left easier than the conventional direction, since movement from the inside to the outside seems more natural for either hand. Right-handed people swing naturally from left to right in reading and writing. Left-handed people or those who have a tendency to left-handedness seem to "feel" naturally a right to left direction. Such children require much more practice in the fixing of direction of eye movements in reading and of hand movements in writing than do average children.

Hildreth (1950) believes that:

> The strokes in our writing are easier for the right-handed person. Left-to-right writing makes it essential for the right-hander to move from left-to-right across the page. These same strokes present difficulties for the left-hander in moving in the

> same direction for he cannot see what he is writing because his hand covers it up, he tends to smear an ink-written line, and his pen sticks into the paper because he must push up instead of pull up as a right-hander. If the left-hander in writing mirrored the right-hander's movements, these difficulties would be avoided, although the writing would not be legible unless viewed in a mirror. No left-handed person writes like a right-hander physiologically. To accomplish the same result he must make quite a different set of movements and motor adjustments. Centrifugal movements for arm and hand are known to be much easier and more graceful than the centripetal.

Improper left-handed handwriting habits can impede a child's speed in handwriting, as well as its quality. It has been found that, on the average, left-handed children reach only 4/5 of the speed of the right-handed. A right-handed pupil, therefore, can do 20 per cent more written work in the same time than a left-handed pupil (Guilford, 1936). This is true, as further indicated by research, only if the left-handed pupil finds instruction that confuses him and is obliged to solve his own problems as the writing is being taught (Enstrom, 1957).

Hildreth (1950) feels the left-handed child in attempting to write works under serious handicaps.

> Tension and strain while writing is shown; his writing is awkward, produced with great effort; the product is scarcely legible. The one armed writing desks used in the higher grades work an added hardship on the left-handed pupil. The lighting conditions also tend to be highly unfavorable. The difficulty these children have had in learning to write may be exhibited in poor writing or very slow writing.

Dallmann (1966) discerns that the disadvantages of the left-handed writer result to a considerable extent from lack of instruction in correct body and paper position:

> Without guidance the child may develop a backward writing slant. He may develop an awkward body position as he writes in a so-called

> 'hook position' in an attempt to see what he is writing while he tilts his paper to the left. He may have his paper in that position in accordance with instructions given to the right-handed child because it has not been explained to the left-handed child that his paper should not be turned in the same way.

Of all the writing problems associated with left-handedness, mirror writing is the most curious. Mirror writing is the reverse of normal writing in lateral orientation. Such writing appears normal only when it is viewed in a mirror.

Reports of mirror writing in scientific literature appeared as early as 1700. Keen interest in the phenomenon has been shown since 1870 when clinical cases began to be reported in scientific publications chiefly by medical men who viewed mirror writing as a pathological symptom. Buchwald questioned whether mirror writing was a pathological sign. He had the idea, like his contemporaries, that mirror writing mirrored the sick mind, and that it was symptomatic of mental disease appearing in abnormal cases (Hildreth, 1950).

Leonardo da Vinci wrote habitually in mirror style with his left-hand from the age of 20, leaving at his death 6,000 pages of manuscript mostly in mirror writing. People said that he did this to conceal his criminal, heretical thoughts about nature and God. Lewis Carroll also did mirror writing, a specimen of which is reproduced by Burt (1937).

In regard to mirror writing Hildreth (1950) states:

> Due to the bilaterally symetrical structure of the body it is natural for the left-handed person to reverse or mirror the normal movements of the right-handed person. When the left-handed child imitates the movements of his right-handed teacher or classmates the most natural thing for him to do is make the same motions in a

centrifugal direction with the result that he mirror writes. To attain the same result as the right-handed person he would have to write upside down. The difficult upstroke with which so many letters begin can be performed more easily by the left-handed person if he writes mirror fashion.

The right-handed person pulls the writing instrument, whereas the left-handed person in order to execute the same patterns must push--just the opposite motion; but in mirror writing he pulls his pencil up from the line just as the right-handed person does. In writing mirror style the left hander can see better what he is writing.

Ilg (1962) believes that reversal is normal for the 5-5½ years old behavior.

We do not think that left-handed babies, as a rule, 'see things backward.' Certainly many children, as they start to read and start to write, go through a normal period when they reverse letters and numbers. Perhaps this occurs a little more extensively in the left-handed child but it also occurs in right.

DETERMINING HANDEDNESS

In order to deal with these problems of the left-hander, the teacher and parents must first become aware of the pupil's hand preference. Casual observations of the child as he goes about activities in which he uses his hands are one means of giving an answer to the question, "Is this child left-handed?" In addition, simple tests, if a variety of them are used, can be given by the classroom teacher.

Monroe's test (1951) may be helpful for detecting hand preference:

1. Place a pencil on a table before the seated child vertically in front of him point of pencil midway between right and left hands. Observe the hand with which he grasps it.
2. Have him put a dot in each square of cross-section and count the number he can mark in one minute. Is he among the best or the

poorest in the class? Does he shift handedness during this performance?

3. Have him repeat the performance with his unpreferred hand. Compare speed and quality with his previous record and with the class.
4. Note hand used in pretending to throw a ball, thread a needle, comb hair, brush teeth, eating, pointing to an object across the room.

Hildreth (1950) suggests a more technical approach in proposing that one scheme to determine whether the child is decidedly right-or left-handed or non-dominant in handedness is to observe and test the child in a number of different situations and then to compute a handedness index using the formula:

$$\frac{\text{Right minus left}}{\text{Right plus left}}$$

This formula gives the percentage of left or right usage to total observations. The scores will range from -1.00 to 1.00. A score of .00 would mean a condition of ambidexterity or non-dominance. High positive scores are obtained by strongly right-handed subjects, low negative scores by strongly left-handed subjects.

In spite of much research, agreement on changing handedness has not been reached. There seems to be considerable evidence for the recommendation by Frank N. Freeman, psychologist and specialist in the field of the teaching of handwriting, who believed that if a child has a definite preference for the left hand especially when at the same time he does not

follow rather readily the suggestion that he write with his right hand, he should be allowed to write with the left hand. It is this recommendation that the writer accepts (Hildreth, 1950).

Reasons given for not insisting that the child with decided left-hand dominance or the child, regardless of dominance, who has long written with the left hand should write with his right hand include:

1. The child with left-hand dominance or the one accustomed to writing with the left hand, regardless of dominance in terms of his hereditary pattern, is often able to write more legibly if he is allowed to write with his left hand.
2. Writing with the right hand by a child with left-hand dominance at times seems to cause nervousness. Even though the incidence has not been established as a frequent result, the seriousness of such a possible development makes many teachers and parents unwilling to risk much encouragement for a change-over.
3. Change from left-handedness to right-handedness in writing seems in some instances to bring about speech difficulties.
4. Change in handedness may cause reversals in reading and writing.

There are some authorities in the field of the teaching of handwriting who believe rather persistent effort should be made, if necessary, to influence the child to write with his right hand. They argue that the likelihood of resulting nervousness, speech difficulties, or problems of reversal in reading and in writing is so small that the change-over should be made in order to avoid the disadvantages of left-handedness.

The claim could be made that the undesirable results from a change-over could possibly be prevented if the transition were made in the best manner feasible (Dallmann, 1966).

HANDEDNESS

The time for this correct analysis of the handedness and for proper instruction is in the primary grades, but intermediate grade teachers need to check each left-handed pupil for the possession of the fundamental habits. It may be necessary to work diligently with those who have acquired poor habits. If a severe case of re-orientation is necessary, the pupil could be excused from most of the written work so that he will not continue practicing his old habits. He will need a good deal more chalkboard writing than the average child. In very severe cases it might be well for the pupil to use only one style, probably manuscript (Burns, 1963).

Modern experts stress the need for the child to develop a strong dominant lead either on the right or left side as an aid to improvement in writing. The child who does not soon settle on one hand or the other for unilateral activities remains immature in drawing, copying, and writing (Hildreth, 1950).

Researchers have concluded that handwriting presents special problems for the left-handed child. The best cure for these problems is prevention. It is difficult to help these children once poor habits have been established. In the opinion of the writer, successful writing with the left-handed is strictly a teaching problem, not a pupil problem. Where teachers understand how to help these writers, pupils write success-

fully, with great speed and ease. In brief, success is not so much a matter of which hand is used for hand-writing as it is the result of learning the most desirable, success-producing approaches.

CHAPTER 3

PROCEDURES

The following procedures were used in this study of the attitudes toward left-handed children.

1. A review of literature was made to determine the problems of the left-handed child as expressed by various authors.
2. Questionnaires were sent to the left-handers' parents and teachers of grades one through six in the Bozeman Elementary Schools to determine their attitudes toward the left-handed child. Comments and suggestions were requested. Questionnaires were given to 180 parents and 144 were returned. Seventy-two faculty members were given questionnaires and sixty-six were returned.
3. The data obtained from these sources were tabulated for study and comparisons. Recommendations of data obtained were made for the teachers.

ANALYSIS OF THE DATA

The parents of left-handed children were asked their attitudes toward the left-handed child. The number and per cent of responses to the questions of the parents are shown in Table I.

TABLE I. NUMBER AND PERCENT OF PARENTS RESPONDING TO QUESTIONS ON ATTITUDES TOWARD THE LEFT-HANDED CHILD.

Question asked	Parents Yes		Parents No	
	* No.	**%	No.	%
1. Would you prefer your child to be right-handed?	39	27.0	105	73.0
2. If your child showed a left-handed tendency would you:				
a. help him shift to the right hand?	0	00.0	144	100.0
b. help him become a better left-hander?	144	100.0	0	00.0
3. Would you prefer to let the child solve his problems of left handedness by himself?	82	61.2	52	38.8
4. Have you ever been worried about your child's left-handedness?	9	6.5	130	93.5
5. Do you feel sorry for your left-handed child?	5	3.5	139	96.5
6. Do you think your child had a need and yet did not receive special instruction to master left-handed problems?	24	17.5	113	82.5
7. Do you feel your child is sensitive about being left handed?	6	4.4	132	95.6

*Indicates Number

**Indicates per cent

This study has indicated that the majority of parents has no preference as to the hand their child chose to use. It was found that 73 per cent of the parents had no preference while only 27 per cent preferred their child be right-handed. The most frequent comment of parents was that before their child had chosen a hand preference the parent preferred right-handedness. However, once the child had indicated a left-handed tendency this preference was accepted. All parents indicated that if their child showed a left-handed tendency they would help him become a better left-hander rather than have him shift to the right hand.

The survey showed that 61.2 per cent would prefer to have the child solve the problems of left-handedness by himself. The remaining 38.8 per cent believed that the child needed special help. Several parents questioned whether the left-hander had any problems.

The parents indicated by their survey that 93.5 per cent had not worried about their child's left-handedness while 6.5 per cent had worried at some time. Of this group of parents surveyed, 96.5 per cent indicated that they did not feel sorry for their left-handed child and only 3.5 per cent who did feel sorry for their left-handed child. Numerous comments showed that many parents had not thought about left-handedness or the problems which might confront their left-handed child. The left-hander preformed as well or better as other children in the family.

The responses of parents (82.5 per cent) indicated that their child had a need and received special instruction to master left-handed problems. It was found that 17.5 per cent believed their child did not receive special instructions at school.

The teachers of left-handed children were asked their attitudes toward the left-handed child. The number and per cent of responses to the questions of the teachers are presented in Table II.

This study showed that 84.2 per cent of the teachers had no preference as to whether they had right or left-handed children in their classroom. It was found that 15.8 per cent preferred to have right-handed children. The most common reason given for preferring right-handers was that the teacher found it easier to demonstrate writing skills to the right-hander. The right-handed teacher found that left-handed children tended to follow their right-handed example.

There was a definite trend in this study which showed that changing handedness should not be required in handwriting. The study indicated that 95.1 per cent believed that changing handedness should not be required in hand writing even though the parents requested. A conference was recommended. All 63 teachers believed that changing handedness should not be required if the parents opposed. If the child showed a left-handed tendency in handwriting 43.2 per cent indicated that they would help him become a better left-handed child and 56.8 per cent would let him choose his hand preference.

The teachers were asked if they considered a special meeting with the parents of left-handed children necessary. It was found that 87.1 per cent did not see a need for a conference. The remaining 12.9 per cent indicated that if problems had developed then a conference would be recommended.

Only 29.7 per cent of the teachers believed that there was any advantage in grouping left-handers together in a classroom while 70.3

TABLE II. NUMBER AND PER CENT OF TEACHERS RESPONDING TO QUESTIONS ON ATTITUDES TOWARD THE LEFT-HANDED CHILD.

	Question asked	Teacher Yes		Teacher No	
		*No.	**%	*No.	**%
1.	Would you prefer to have right-handed children as opposed to left-handed children in your classroom?	10	15.8	53	84.2
2.	Do you think that changing handedness should be administered in handwriting if parents request?	3	4.9	59	95.1
3.	Do you think that changing handedness should be administered in handwriting if parents oppose?	0	00.0	63	100.0
4.	If the child showed a left-handed tendency in handwriting would you:				
	a. help him shift to the right hand?	0	00.0	0	00.0
	b. help him become a better left-hander?	32	43.2	0	00.0
5.	Would you prefer to let the left-handed child solve handwriting problems by himself?	22	35.5	40	64.5
6.	Do you think left-handed children have need for special instruction to master left-handed problems?	27	43.5	35	56.5
7.	Do you give special instruction to master left-handed problems?	30	46.1	35	53.9
8.	Do you consider your school has adequate equipment to meet the needs of the left-handed child?	56	90.3	6	9.7
9.	Do you consider it difficult to find time to assist the left-handed child in learning to write?	11	16.9	54	83.1
10.	Are you reluctant to instruct them in handwriting?	5	7.8	59	92.2
11.	Do you consider a special meeting with the parents of left-handed children necessary?	8	12.9	54	87.1

TABLE II.
(continued)

	Question asked	Teacher Yes *No.	Teacher Yes **%	Teacher No *No.	Teacher No **%
12.	Do you think there would be advantages in grouping left-handers together in your classroom?	19	29.7	45	70.3
13.	If a left-handers' poor writing habits are well established do you think he should be changed to better writing methods?	43	70.5	18	29.5

*Indicates Number
**Indicates per cent

per cent took the opposite viewpoint. Many commented that the left-hander should not be singled out as being different. However, a few recognized the possibility of one left-hander assisting another left-hander while learning new skills.

The question of whether left-handed children needed special instruction to master left-handed problems was answered affirmatively by 43.5 per cent and negatively by 56.5 per cent. Those indicating that they gave special instruction to master left-handed problems made up 46.1 per cent while 53.9 per cent did not give special help. According to the numerous comments special instruction was given for handwriting skills such as slant of paper, pen, and letters; proper methods of holding a pencil or crayon; cutting and folding paper in art.

Most teachers (83.1 per cent) did not find it difficult to find time to assist the left-handed child in learning to write. The remaining 16.9

per cent noted that time was a limiting factor in providing any extra assistance in school subjects.

This study indicated that the majority of teachers (90.3 per cent) felt that their school had adequate equipment to meet the needs of the left-handed child.

The teachers were divided on their opinion of whether the left-handed child should solve handwriting problems by himself. The survey showed that 22 teachers (35.5 per cent) believed the left-hander needed help. The other 40 teachers (64.5 per cent) did not recognize the necessity of assisting the left-hander. The comments suggested that many teachers would give assistance if a specific problem developed.

The faculty survey listed 7.8 per cent of the group as feeling reluctant to instruct left-handers in handwriting. The most frequent reason given was that they lacked knowledge of the new techniques in teaching the left-hander writing skills. A few teachers indicated that as new teachers they felt inadequate in teaching a left-hander to write. This concern was often dismissed when the left-hand students performed as well or better than the right-hand group in writing. A strong 92.5 per cent believed that they had adequate knowledge to instruct handwriting for the left-hander.

The majority of teachers (70.5 per cent) indicated that if poor writing habits are well established the left-hander should be changed to better writing methods. Only 29.5 per cent believed that the habits should not be changed.

The parents and faculty members of left-handed children were asked similar questions regarding their attitudes toward the left-handed child. The number, per cent, and significance of differences in responses are shown in Table III.

The parents of left-handed children (42.6 per cent) and teachers (55.4 per cent) believed that the left-handed child would be confronted with more problems in a right-handed world than a right-handed person. Both parents and teachers qualified their answer by stating that most of the problems could be overcome with understanding and patience. The remaining 57.4 per cent of the parents and 44.6 per cent of the teachers felt that if an issue was not made of the child's left-handedness, there would not be any problem.

The parents and teachers were asked whether they talked to the child about his left-handedness and the problems he might be confronted with in a right-handed world. The study indicated that 34.5 per cent of the parents and 24 per cent of the teachers found it desirable to discuss problems of left-handedness with the child. The opposite viewpoint was taken by 65.5 per cent of the parents and 76 per cent of the teachers.

It was noted in this study that fewer parents (47.1 per cent) and teachers (30.5 per cent) believed that there were some advantages in being left-handed. The advantages listed included playing baseball; working with a right-handed person allowing one to work from the left side, the other from the right side.

TABLE III. NUMBER AND PER CENT OF DIFFERENCES OF TEACHERS AND PARENTS RESPONDING TO QUESTIONS ON ATTITUDES TOWARD THE LEFT-HANDED CHILD.

	Question asked	Teacher Yes		Teacher No		Teacher Yes		Teacher No	
		*No.	**%	*No.	**%	*No.	**%	No.	**%
1.	Do you think the left-handed child will be confronted with more problems in a right-handed world than a right-handed person?	58	42.6	78	57.4	36	55.4	29	44.6
2.	Do you talk to your child about his left-handedness and the problems he may be confronted with in a right-handed world?	49	34.5	93	65.5	14	24.0	45	76.0
3.	Do you think there are some advantages in being left-handed?	64	47.1	72	52.9	18	30.5	41	69.5
4.	Have other children made fun of your child because of his left-handedness?	6	4.5	128	95.5	2	3.0	63	97.0
5.	Does your child lack self-confidence in motor skills?	12	10.0	108	90.0	8	12.3	57	87.7
6.	Do you consider the left-hander more awkward than right-handed children?	23	16.2	119	83.8	12	16.9	59	83.1
7.	Do you think it was more difficult for the left-handed child to learn to write than it was for the right-handed children?	42	30.4	96	69.6	22	34.3	42	65.7
8.	Did you note any frustrations when the child was learning to write?	36	25.3	106	74.7	13	20.6	50	79.4

*Indicates Number
**Indicates Per cent

Only a small minority of the parents (4.5 per cent) and teachers (3 per cent) indicated that other children had made fun of the child because of his left-handedness. The other parents (95.5 per cent) and teachers (97 per cent) did not find this a disturbing factor.

The survey showed that parents and teachers do not feel that the left-handed child lacks self-confidence in motor skills. There were 90 per cent of the parents and 87.7 per cent of the teachers who took this viewpoint. The other group of parents (10 per cent) and teachers (12.3 per cent) felt their child lacked self confidence. A similar question showed that only 16.2 per cent of the parents and 6.9 per cent of the teachers considered that the left-handed children were more awkward.

The parents (30.4 per cent) and faculty (34.3 per cent) believed that handwriting was more difficult for the left-hander than the right-hander. There were 69.6 per cent of the parents and 65.7 per cent of the teachers who did not see any problem for the left-handed writer. The majority of parents (74.7 per cent) and teachers (79.4 per cent) did not note any frustrations when the child was learning to write.

The faculty surveys included questions pertaining to the current techniques used by teachers in handwriting instruction. The trends in methods used in teaching the left-handed child how to write are shown in Table IV.

In beginning handwriting instruction 59 per cent indicated that the left-handed child should write at his desk while 36.1 per cent believed that the left-hander should write at the chalkboard. The remaining 3 per cent indicated that the child should be allowed to write at the chalkboard

TABLE IV. NUMBER AND PER CENT OF TEACHERS RESPONDING TO QUESTIONS ON TEACHING LEFT-HANDED CHILDREN TO WRITE.

Question asked	Teacher Yes *No.	**%
1. In beginning handwriting instruction would you have the left-hander:		
a. write at the chalkboard?	22	36.1
b. write at his desk?	36	59.0
c. either?	3	4.9
2. A left-hander should sit at a desk adjusted:		
a. comparatively low?	0	00.0
b. comparatively high?	0	00.0
c. the same as right-handers?	63	100.0
3. It is believed that a left-handed child should have a pencil with:		
a. a hard lead?	4	6.4
b. a soft lead?	20	31.7
c. either a soft lead or hard lead depending on the child's preference?	39	61.9
4. The best pen for the left-handed child would be:		
a. a pen with a steel nib?	2	5.6
b. a ballpoint pen?	34	94.4
5. A left-hander should be instructed to hold a pen or pencil:		
a. a little higher than a right-hander?	4	6.5
b. a little lower than a right-hander?	0	00.0
c. a comfortable position for him?	58	93.5
6. In helping the left-hander would you:		
a. slant the pen toward the writer's left shoulder?	31	47.7
b. slant the pen toward the writer's right shoulder?	2	3.1
c. let him choose?	32	49.2

TABLE IV.
(continued)

Question asked	Teacher Yes *No.	**%
7. In helping the left-hander would you:		
a. slant the paper to the right?	36	56.3
b. allow the paper to be vertical?	4	6.2
c. slant the paper to the left?	2	3.1
d. let him choose?	22	34.4
8. The best method of presenting copy for the left-hander's writing exercise should be:		
a. directly in front of the writer?	20	43.5
b. on the chalkboard?	12	26.1
c. either?	14	30.4
9. When instructing the left-hander would you have him:		
a. slant the letters to the right?	17	26.6
b. slant the letters to the left?	2	3.1
c. use the vertical form?	5	7.8
d. determine his own letter slant?	40	62.5
10. The change from manuscript to cursive writing for the left-hander should:		
a. be postponed longer than most of the right-handers?	0	00.0
b. be presented at the same time as right-handers?	59	100.0
c. not be compulsory for left-handers?	0	00.0

*Indicates Number
**Indicates Per cent

and at his desk. All the teachers believed the desk of a left-hander should be adjusted at the same height as for right-handers.

The question asking what type of a pencil a left-hander should use indicated that 61.9 per cent preferred to allow the child to choose; 6.4 per cent a hard lead; 31.7 per cent a soft lead.

The writer believed that the limited number of responses in the survey regarding the best pen for the left-hander indicated a lack of knowledge on the question. The 34 teachers responding answered that a ball point pen was preferable to a pen with a steel nib. Most teachers (93.5 per cent) believed that a left-hander should be instructed to hold a pen or pencil at a comfortable position for him. The remaining 6.5 per cent indicated that the pen or pencil should be held a little higher than a right-handed writer. In helping the left-handed child with a pen, 47.7 per cent believed the slant of the pen should be toward the writer's left shoulder; 3.1 per cent toward the writer's right shoulder; 49.2 preferred to let the child choose.

In helping the left-handed child slant his (or her) paper, the teachers indicated that 56.3 per cent would slant the paper to the right; 3.1 per cent to the left; 7.8 per cent allow the paper to be vertical; 62.5 determine his own slant. When instructing the left-hander on letter slant, 26.6 per cent would slant the letters to the right; 3.1 per cent slant the letters to the left; 7.8 per cent use the vertical form; 62.5 per cent allow him to determine his own letter slant.

The best methods of presenting copy for the left-hander's writing exercise indicated that 43.5 per cent believed the material should be

directly in front of the writer; 26.1 per cent on the chalkboard; 30.4 per cent that both methods were desirable.

All 59 teachers indicated that the change from manuscript to cursive writing for the left-hander should be presented at the same time as right-handed children rather than being postponed longer than most of the right-handed children or not being compulsory for left-handed children.

The statistics in this chapter indicated the opinion of the parents of left-handed children and faculty members of the Bozeman Elementary School System. In the following chapter the significance of these statistics is discussed and recommendations are given for the teacher.

Chapter 4

SUMMARY, CONCLUSIONS, RECOMMENDATIONS

SUMMARY

The purpose of this study was to determine the attitudes of the left-hander's parents and teachers toward the left-handed child.

A survey of literature identified possible problems of left-handers in the areas of speech, reading, and writing. A review of experimental studies in each area gave both affirmative and negative reports. The studies indicated the need for continued research in the relationship of eye-hand preference to speech, reading and writing disabilities due to the complexity of laterality.

The responses to the parent questionnaire showed that the majority of parents had no objection to their child's left-hand preference once he had made a choice of handedness. The parents did not accept the suggestion of shifting the child to the right hand. Only 38.8 per cent preferred to help the child solve the problems of left-handedness. Several parents indicated that they did not recognize any problems as a result of their child's left-handedness. Most parents had never worried or felt sorry for their left-handed child. There were 82.5 per cent of the parents who indicated that their child had received special instruction in order to master the problems of left-handedness.

The majority of faculty members indicated that they had no preference as to whether they had left or right-handed students. Teachers felt that changing handedness should not be required in handwriting. Many teachers opposed the idea of activities which would single the left-hander out as being different from the group. However, there was 43.5 per cent

who felt that the left-hander needed special instructions. The majority of teachers felt that they could instruct the left-handed writer adequately in handwriting.

A higher percentage of parents (42.6 per cent) and teachers (55.4 per cent) believed that the left-hander would be confronted with more problems than a right-handed child. However, the parents and teachers believed that problems could be easily overcome with proper guidance. Advantages of being left-handed were recognized in a limited number of activities. Few parents or teachers had observed poor motor skill, awkwardness, or negative attitudes toward the child as a result of left-handedness. Handwriting was considered to be more difficult for the left-hander than the right-hander by only 30.4 per cent of the parents and 34.3 per cent of the faculty.

Techniques in handwriting instruction of the Bozeman Elementary Teachers were reviewed. It was noted that there was a trend to allow the left-hander to choose the technique most desirable for him rather than a definite method of procedure.

CONCLUSIONS

On the basis of this study the following conclusions were drawn:

1. Traditional prejudice against the left-handed child by parents and teachers is minimal, if any exists.
2. Parents and teachers do not practice or recommend the policy of shifting a left-handed child to the right hand.
3. The majority of parents and teachers have no preference as to right or left-handed children in the home or at school.

4. The majority of parents and teachers believed the left-handed child could solve his own problems of left-handedness without their help.
5. Motor skill ability and awkwardness were not considered to be a result of left-handedness by the majority of parents.
6. Apathy for the left-hander was minimal as indicated by the parent questionnaire.
7. Several parents and teachers indicated the left-hander would be confronted with more problems than a right-hander in a right-handed world.
8. The majority of faculty felt competent instructing left-handers in handwriting.
9. There was a trend to allow the left-hander to choose a technique or method comfortable for him.

RECOMMENDATIONS

The writer, a left-hander, is of the opinion that the left-handed child encounters several disadvantages in a right-handed world. However, these disadvantages will remain minimal if the problem is identified and the proper guidance and assistance are administered. The left-handed child need not be pointed out as different. He need not even be aware of left-handedness. Constructive handling of any problem in a home or classroom situation or classroom need not bring the problem to the foreground.

This study has indicated a trend toward more understanding of the left-hander. To fully understand the left-hander, however, the author

recommends that a study dealing directly with the left-handed child be conducted to determine the self-perception of attitudes and possible problems encountered by the left-handed child himself.

The writer feels that the disadvantages of left-handedness can be reduced considerably through proper guidance. Thus, some constructive ideas which have been generally accepted by those engaged in handwriting research and by thoughtful teachers have been compiled. The following recommendations should be observed when helping the child who writes with his left hand:

1. If the beginning pupil comes to school decidedly preferring the left hand, he ought to be helped to become a good left-handed writer. If dominance has been established before the child enters school, there is little justification for attempting to change it.

2. If the beginning pupil comes to school with unsure handedness, or ambidexterity, he should be encouraged with his and his parent's full acceptance and willingness to become a good right hand writer. It should be remembered that how the teacher goes about encouraging right-handedness may well make for positive or negative results.

3. If a child has been in school a few years and has established awkward left-handed habits, changes toward better left-handed habits should be encouraged, again with the full acceptance and willingness of the child and the parents.

4. A special meeting with parents of left-handed children is of value. Stress at this meeting the normalness of being left-handed, the problems relating to changing handedness, and a demonstration of proper left-handed writing.

5. Help the left-handed children feel that there is nothing wrong or odd in being left-handed.

6. Group the left-handed together. This makes it easier to supervise instruction and prevents a tendency to imitate right-handed individuals. A left-handed child may be a good helper to another left-hander.

7. Begin instruction at the chalkboard where the writer stands directly in front of his writing. Stress left-to-right movement and the starting place when writing each letter. Circles should be made from left to right in manuscript, even though this may seem awkward at first.

8. The teacher might guide the hand movements to assure the correct response.

9. Sit the left-hander at a desk which is adjusted comparatively low so that the writer can look down over the hand and see where the point of the pen touches the paper.

10. Furnish the left-handed pupil with a pencil with hard lead to avoid smudging. If he uses a ball point pen, give him one that does not smear. A good ballpoint pen is a better writing instrument for the left-handed person than a pen with a steel nib. The ball point does not dig into the paper with the upstrokes, and the ink dries immediately.

11. The pen or pencil is held with the thumb, index, and middle fingers. It should slant toward the writer's left shoulder. The pen should be held a little higher than for a right-handed writer, so that the child can see what he writes and avoid running the left hand over the written material. A rubber band or other marker placed around the pencil or pen at this point will serve as a reminder.

12. The left arm should be quite close to the body so that the tendency toward driving the wrist is offset, at least in part.

13. In manuscript writing the paper should be held as it is for the right-handed child, parallel to the edge of the desk.

14. In cursive writing the paper should be slanted to the right at an angle somewhere between 30 and 45 degrees from the line formed by the edge of the desk.

15. The paper should be placed in front of the writer or a little to the left. The second alternative given here is preferable when the child is copying something from a book or paper on his desk and if the desk provides rather limited space. The forearm should be at approximately a right angle to the line of writing.

16. The natural arc of the left-hand as it rests on the desk should determine the position of the paper for cursive writing. The upper right corner of the paper will be in line with the centerline of the body. Children can be told that the bottom corner should point "toward their heart." In shifting the paper the right hand presses down on it, holding it firmly until one line is finished, and then moves it up for the next line. The left-hand slides lightly along the line of writing while the paper is kept stationary.

17. Let the child determine his own letter slant after you have established the proper position of the paper for him. Most left-handed children seem to prefer a vertical form of writing. A few find a backhand more natural. Since our objective is legibility and ease of writing, slant should not be predetermined for the left-hander.

18. When the left-hand child starts writing on paper, it may be wise to have him place an arrow as a sign for the beginning of his writing to assure the teacher that he is starting at the correct place and proceeding in the correct left to right direction.

19. Copy for the left-handed writing exercise should be directly in front of the writer, not on the chalkboard. At first some children need to have their hands guided through the proper movements. If a single letter is reversed in any writing, take time to work on that letter alone.

20. If the left-handed writer is having writing difficulties postpone the change over from manuscript to cursive writing longer than most of the right-handed children. In fact, arguments against a change over from manuscript to cursive handwriting are more convincing in cases of the right-handed.

21. If the child who has reached the fifth grade is using an awkward position, it is sometimes best to let him continue. Urge instead that he learn to use the typewriter as soon as possible. Some school systems have special summer classes in typing for such left-handed children. Here the left-hander has an advantage over right-handed people; the standard typewriter keyboard was designed by a left-handed person.

22. Supervise carefully a left-handed pupil's experiences in the early stages of learning to write so that he places his paper correctly, holds his writing instrument properly, sits in good position, and uses correct arm and hand movements.

APPENDIX

Dear Parents:

A study is being made on the problems confronting the left-handed child. We would appreciate your co-operation in assisting us in this study by filling out the following questionnaire. No signature is necessary. In order to help the left-handed child, we must know their attitudes and the attitudes of other people in connection with left-handedness.

This is not a test or quiz. It is a questionnaire designed to determine the attitudes of parents toward left-handedness. Please mark this questionnaire as carefully as you can.

Thank you.

(CHECK DESIRED ANSWER)

1. Would you prefer your child to be right-handed?_____Yes_____No

Preference

2. If the child showed a left-handed tendency would you:

   a. help him shift to the right-hand?_____Yes_____No

   b. help him become a better left-hander?_____Yes_____No

3. Would you prefer to let the child solve his problems of left-handedness by himself?_____Yes_____No

4. Have you ever been worried about your child's left-handedness?

_____Yes_____No

5. Do you feel sorry for your left-handed child?_____Yes_____No

6. Do you consider that your child is more awkward than right-handed children?_____Yes_____No

7. Do you think your left-handed child will be confronted with more problems in a right-handed world than a right-handed person?

_____Yes_____No

8. Do you talk to your child about his left-handedness and the problems with which he may be confronted in a right-handed world?

_____Yes_____No

9. Do you think there are some advantages in being left-handed?

_____Yes_____No

10. Do you think your child had a need and yet did not receive special attention to master left-handed problems?_____Yes_____No

11. Have other children made fun of your child because of his left-handedness?_____Yes_____No

12. Do you feel your child is sensitive about being left-handed?

_____Yes_____No

13. Does your child lack self-confidence in motor skills?_____Yes_____No

14. Do you think it was more difficult for your child to learn to write than it was for right-handed children?_____Yes_____No

15. Did you note any frustrations when your child was learning to write?_____Yes_____No

Faculty Members:

This survey is designed to obtain the teacher's attitude toward the child who is left-handed. We would appreciate your co-operation in assisting in this study by filling out the following questionnaire. No signature is needed. In order to help the left-handed child, we must know their attitude and the attitude of other people in connection with left-handedness. An attitude survey has been given to the parents. Recommendations of data obtained will be made available when we have completed compilation.

Thank you.

(CHECK ANSWER DESIRED)

1. Would you prefer to have right-handed children as opposed to left-handed children in your classroom?_____Yes_____No Preference
2. If answer is yes, why would you prefer not to have left-handed children?
3. If the child showed a left-handed tendency in handwriting would you: (Select one)
   a. help him shift to the right hand?_____
   b. help him become a better left-handed child?_____
   c. let him choose?_____
4. Would you prefer to let the left-handed child solve handwriting problems by himself?_____Yes_____No
5. Do you think that changing handedness should be administered in handwriting if the parents request?_____Yes_____No
6. Do you think that changing handedness should be administered in handwriting if parents oppose?_____Yes_____No

7. Do you think left-handed children will be confronted with more problems in a right-handed world than a right-handed person?____Yes____No
8. Do you talk to the left-handed children about their left-handedness and the problems they may be confronted with in a right-handed world?_____Yes_____No
9. Do you think left-handed children have need for special instruction to master left-handed problems?_____Yes_____No
10. Do you give special instruction to master left-handed writing problems?_____Yes_____No
11. If answer is yes, what are your instructions?

12. Do you think that there are some advantages in being left-handed?

_____Yes_____No

13. If answer is yes, what are some advantages?

14. Have other children made fun of these children due to their left-handedness?_____Yes_____No
15. Do you consider left-handed children more awkward than right-handed children?_____Yes_____No
16. Do you consider your school has adequate equipment to meet the needs of the left-handed child?_____Yes_____No
17. Does the left-handed child lack self-confidence in motor skills?

_____Yes_____No

18. Do you consider it difficult to find time to assist the left-handed child in learning to write?_____Yes_____No

19. Are you reluctant to instruct them in handwriting?_____Yes_____No

20. If answer is yes, why are you reluctant?

21. Do you think it is more difficult for the left-hander to learn to write?_____Yes_____No

22. Do you note any frustration when a left-handed child is learning to write?_____Yes_____No

23. If a left-hander's poor writing habits are well established to you think he (or she) should be changed to better writing methods?

_____Yes_____No

24. Do you consider a special meeting with the parents of left-handed children necessary?_____Yes_____No

25. Do you think there would be an advantage in grouping left-handers together in your classroom?_____Yes_____No

(SELECT ONE)

26. In beginning handwriting instruction would you have the left-hander:

    a. write at the chalkboard?_____

    b. write at his desk?_____

    c. either?_____

27. A left-hander should sit at a desk adjusted:

    a. comparatively low?_____

    b. comparatively high?_____

    c. the same as right-handers?_____

28. It is believed that a left-handed child should have a pencil with:

    a. a hard lead?_____

    b. a soft lead?_____

    c. either a soft lead or hard lead depending on the child's preference?_____

29. The best pen for the left-handed child would be:

    a. a pen with a steel nib?_____

    b. a ballpoint pen?_____

30. A left-hander should be instructed to hold a pen or pencil:

    a. a little higher than a right-handed writer?_____

    b. a little lower than a right-handed writer?_____

    c. at a comfortable position for him?_____

31. In helping the left-handed child would you:

    a. slant the pen toward the writer's left shoulder?_____

    b. slant the pen toward the writer's right shoulder?_____

    c. let him choose?_____

32. In helping the left-handed child would you:

    a. slant the paper to the right?_____

    b. allow the paper to be vertical?_____

    c. slant the paper to the left?_____

    d. let him choose?_____

33. Copy for the left-handed writing exercise should be:

    a. directly in front of the writer?_____

    b. on the chalkboard?_____

    c. either?_____

34. When instructing the left-hander would you have him:

    a. slant the letters to the right?_____

    b. slant the letters to the left?_____

    c. use the vertical form?_____

    d. determine his own letter slant?_____

35. The change from manuscript to cursive writing for the left-hander should:

    a. be postponed longer than most of the right-handed children?_____

    b. be presented at the same time as right-handed children?_____

    c. not be compulsory for left-handed children?_____

COMMENTS:

LITERATURE CITED

Ballard, P. B., "Sinistrality and Speech," Journal Experimental Pedagogy and Training College Record, 1:298-310, 1912.

Balow, I. H., "Lateral Dominance Characteristics and Reading Achievement in the First Grade," Journal of Psychology, 55:323-328, 1962.

Balow, I. H., and Balow, B. "Lateral Dominance and Reading Achievement in the Second Grade," American Educational Research Journal, 1:139-143, 1964.

Becky, R. E., "A Study of Certain Factors Related to Retardation of Speech," Journal Speech Disorders, 7:223-249, 1942.

Brain, W. R., "Speech and Handedness," Lacet, 249:837-841, 1945.

Breckenridge, Marian, and Vincent, Lee, Child Development, W. B. Saunders Co., Philadelphia, 1949, 352 p.

Bryngelson, B., and Rutherford, B., "A Comparative Study of Laterality of Stutterers and Non-Stutterers," Journal Speech Disorders, 2:12-16, 1937.

Burns, Paul C., Improving Handwriting Instruction in Elementary Schools, Burgess Pub. Co., Minneapolis, 1963.

Burt, C., The Backward Child, Macmillan Pub. Co., 1937.

Carrother, George, "Left-Handedness Among School Pupils," American School Board Journal, 114:17-19, May, 1947.

Chesher, E. C., "Some Observations Concerning the Relation of Handedness to the Language Mechanism," Bulletin Neurological Institute, 4:556-562, 1936.

Cole, Luella W., The Elementary School Subjects, Rinehart and Co., New York, 1946, 209 p.

Dallmann, Martha, Teaching the Language Arts in the Elementary School, W. C. Brown Co., Dubuque, Iowa, 1966, 143 p.

Daniels, E. M., "An analysis of the Relation Between Handedness and Stuttering," Journal Speech Disorders, 5-309-326, 1940.

Dayhaw, Lawrence T., "Guiding Handedness in the Development of the Child," Education, 74:196-199, November, 1953.

Dearborn, W. E.; Carmichale, L.; and Lord, E. E., "Special Disabilities in Learning to Read and Write," Harvard Monograph in Education, 2:3, 1925.

Delacoto, Carl H., The Diagnosis and Treatment of Speech and Reading Problems, Charles Thomas Co., Springfield, Illinois, 1963.

Downey, J. E., "Types of Dextrality and Their Implications," American Journal Psychology, 38:317-367, 1927.

Edfelt, A. W., Reading Reversal and Its Relation to Reading Readiness, University of Stockholm, Stockholm, Swededn, 1955.

Enstrom, Erick A., "The Extent of the Uses of the Left-hand in Handwriting and the Determination of the Relative Efficiency of the Various Hand-Wrist-Arm-Paper Adjustments," Thesis Abstracts, No. 5, University of Michigan, 1957.

Everhart, R. W., "The Relationship Between Articulation and Other Developmental Factors in Children," Journal Speech Hearing Disorders, 18: 332-338, 1953.

Fletcher, John M., The Problem of Stuttering, Longmans, Green Co., New York, 1928, 362 p.

Gates A., and Bond, G. L., "Relation of Handedness, Eye-Sighting and Aquity Dominance to Reading," Journal of Educational Psychology, 27: 450-456, 1936.

Gottlober, A. B., Understanding Stuttering, Crune and Stratton Co., New York, 1953, 74 p.

Grinker, K. R., and Bucy, P. C., Neurology, (4th ed.), Thomas Publishing Co., 1951, 410 p.

Guilford, Will H., "Left-Handedness: Its Effect Upon the Quality and Speed of Writing of Pupil in the Fifth & Sixth Grade," unpublished Master's Thesis, College of Puget Sound, 1936.

Harris, A. J., "Diagnosis and Remedial Instruction in Reading," Innovations and Change in Reading Instruction, University of Chicago Press, Chicago, 1968.

_____, "Lateral Dominance, Directional Confusion and Reading Disability," Journal of Psychology 44: 383-394, 1957.

_____, Harris Tests for Lateral Dominance--Manual of Directions, Psychological Corporation, New York, 1958, 3 p.

Hildreth, Gertrude, "The Development and Training of Hand Dominance," Journal of Genetic Psychology, 74:197-275, 1949; 75:39-154, 1950.

Ilg, Francis and Ames, Louis, Parents Ask, Harper Bros., 1962.

Jersild, A. T., Child Psychology, Prentice Hall, Englewood Cliffs, New Jersey, 1960, 109 p.

Johnson, Wendell, Stuttering in Children and Adults, University Minnesota Press, Minneapolis, 1955, 72, 122 p.

Johnson, W., and House, E. "Certain Laterality Characteristics of Children with Articulatory Disorders," Elementary School Journal, 38:52-58, 1937.

Kennedy, H., "Reversals, Reversals, Reversals," Journal Experimental Education, 23:169, 1954.

Milisen, R. L., and Johnson, W., "A Comparative Study of Stutterers," Archives of Speech, 1:61-86, 1936.

Money, John, The Disabled Reader, John Hopkins Press, Baltimore, 1966, 31 p.

Monroe, Marion, Children Who Cannot Read, University of Chicago Press, Chicago, 1967, 90 p.

_____, Growing into Reading, Scott, Foresman Co., Chicago, 1951, 50p.

Morsh, Joseph, "The Development of Right-Handed Skill in the Left-Handed Child," Child Development 1:311-324, 1930.

Muehl, S., "Relation Between Word Recognition Errors and Hand-Eye Preference in Preschool Children," Journal of Educational Psychology 54:316-321, 1963.

Oates, D. W., "Left-Handedness in Relation to Speech Defects, Intelligence, and Achievement," Forum Education, 7:91-105, 1929.

Ojemann, R. H., "Studies in Handedness" Journal Educational Psychology, 22:120-126, 1931.

Parson, B. S., Left-Handedness: A New Interpretation, Macmillan Co., New York, 1924, 185 p.

Penfield, W., and Rassmussen T., The Cerebral Cortex of Man, Macmillan Co., New York, 1955, 96 p.

Robbins, Melvyn P., "Delacoto Interpretation of Neurological Organization," Reading Research Quarterly, Spring, 1966, 57 p.

Schubert, Delwyn, The Doctor Eyes the Poor Reader, Charles Thomas Co., Springfield, Illinois, 1957, 24 p.

Spadino, E. J. "Writing and Laterality Characteristics of Stuttering Children," Teachers College Contributions to Education, No. 837, 1941, 82 p.

Smith, Linda, "A Study of Laterality Characteristics of Retarded Readers and Reading Achievers," Journal of Experimental Education,18: 321-329, 1950.

Stephens, W. E.; Cunningham, E.S.; and Stigler, B. J., "Reading Readiness and Eye-Hand Preference Patterns in First Grade Children," Exceptional Children,33:481-488, 1967.

Stevenson, Lilian P., and Robinson, Helen, "Eye-Hand Preference, Reversa sals, and Reading Progress," Supplementary Educational Monographs, University of Chicago Press, Chicago, 77:83-88, 1953.

Stoddard, George,and Wellman, Beth, Child Psychology, Macmillan Co., New York, 1934, 318 p.

Tiner, Miles, and McCullough, Constance, Teaching Elementary Reading, Appleton-Century Croft Co., New York, 1962, 65 p.

Tinker, Karen J. "The Role of Laterality in Reading Disability," In J. A. Figurel (Ed.) Reading and Inquiry. Proceedings of the International Reading Association, 1965, 300 p.

Travis, L. E., Diagnosis in Speech, Public School Publishing Co., Bloomington, Illinois, 1935, 429 p.

_____, Speech Pathology, Appleton-Croft Co., New York, 1931, 331 p.

Travis, L. E. and Johnson, W., "Stuttering and the Concept of Handedness," Psychological Review, 41:534-562, 1934.

Van Riper, C., Speech Correction, Prentice Hall, New York, 1947, 143 p.

Wallin, J. E. "A Census of Speech Defects," School and Society, 3:213-216, 1916.

Weintraub, Samuel, "Eye-Hand Preference and Reading," The Reading Teacher 21:369, January, 1968.

Wepman, J., "Is Stuttering Inherited?" Proceedings of the American Speech Correction Association, 5:39, 1935.

West, R. S. and Berry, F. B., "The Heredity of Stuttering," Quarterly Journal of Speech, 25:23-30, 1939.

Witty, Paul and Kopel, David, "Sinistrad and Mixed Manual-Ocular Behavior in Reading Disability," Journal Educational Psychology, 27:131, 1936.