Review of literature regarding the causes and remediation of reversal tendencies in disabled readers

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A REVIEW OF LITERATURE REGARDING THE CAUSES AND REMEDATION OF REVERSAL TENDENCIES IN DISABLED READERS

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CHAPTER I
THE PROBLEM

Introduction

Learning to read challenges not only a child's intellectual capacity, but also one of the basic conceptions he has evolved concerning the perceptual world about him. This conceptual assumption is often referred to as the Law of Object Constancy. In the years of preschool a child perceives that any object has the same name, meaning, or symbolic value regardless of changes in its directional orientation or rotation in space. Despite size, some addition or removal, translocation or camouflage of the component parts, a chair, bicycle, or house retains its name and characteristics.¹

However, this is not the case with letters. The letters of the alphabet cannot be added to or removed to change the form. The beginning reader may be confused if he does not adjust his concept of objects in relation to letters of the alphabet. Most children make this adjustment, but a few lack this skill and may have reversal problems in reading.

To most teachers the left-to-right sequence of reading seems so simple and obvious as to be taken for granted. However, teachers must first realize a child's difficulty and how seriously the failure to dis-

criminate the directional sequence of words and letters in reading may affect his reading progress.\footnote{Marion Monroe, \textit{Children Who Cannot Read} (Chicago: Univ. of Chicago Press, 1950), p. 127.}

Errors of reversal have long been identified with reading disabilities. Observations have been made of individuals who wrote in reversed patterns such as mirrored fashion, or who jumbled letters within words and displaced digits in numbers that were written or copied. Studies made by psychologists, neurologists, physicians, and educators have shown that a factor involved in the problem of the non-reader is this tendency to confuse symbols, both as regards their position and their sequence.

Harris indicates that reversals are prominent among the errors of about one reading disability case out of ten.\footnote{Albert J. Harris, \textit{How to Increase Reading Ability} (New York: Longman's Green and Co., 1961), p. 370.} However, reversals are regarded by some teachers of reading as perhaps the "most persistent and insidious problem facing the reading teacher, be he in the classroom, clinic, or remedial situation."\footnote{Raymond Laurita, "Reversals: a Response to Frustration?" \textit{Reading Teacher}, XXV (October, 1971), 45.}

Reversal errors are few among the other errors made in reading. However, there are confusions in learning caused by reversibility of certain symbols. "This probably explains why other errors in reading drop out while reversals tend to remain and appear to present a special problem in reading."\footnote{M. Krise, "Reversals in Reading: a Problem in Space Perception?" \textit{Elementary School Journal}, XLIX (January, 1949), 284.}
Consistent reversal errors beyond the beginning stages in learning to read are regarded as symptoms of reading difficulty. Hicks states:

‘Seldom if ever, does one find an individual letter reversal as an isolated problem in an otherwise adequate reader. Most often it may be viewed as one of a cluster of symptoms constituting a severe language disability. If such reversals are symptoms of a severe language disability, it is not uncommon to find an extreme history of academic failure.’

Purpose of the Study

The purpose of this study was to investigate various aspects of reversal errors made by children having reading difficulty.

In accordance with this purpose the study had the following specific objectives:

1. to review research findings and readings concerning the types, possible causes, and significance of reversal errors,
2. to compile a list of diagnostic tools and procedures that can be used by teachers to determine the presence of consistent reversal errors,
3. to describe various techniques and programs to aid teachers in preventing or eliminating reversal errors.

Scope and Limitations

The writer has limited her study to problems of reversal in disabled readers of average intelligence. Because authorities, such as Otto,2

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Dechant,¹ and Woestehoff² agree that reversal errors are not always significant unless they persist beyond primary grades, most of the discussion has been directed to older students of reading. However, mention of reversal tendencies at earlier levels has been included to draw attention to the prevention of these tendencies in later years.

Definition of Terms

Because various terms are used by authors in their treatment of reversals and the disabled reader, a clarification of these terms and related terms has been offered.

Bond and Tinker state that no child should ordinarily be considered a disabled reader unless there is a discrepancy between his learning capacity or general verbal intelligence and his reading performance.³

Money describes the disabled reader as "one whose condition is that of being unable to thrive pedagogically, unable to profit from standard methods of instruction, and unable to read."⁴

A description of the non-reader is offered by Teegarden.

The child of normal intelligence and vision, who under the usual school instruction, does not learn to read above first or second grade level. Such individuals are often found in the third, fourth, or fifth grade, doing poor or failing work, though they are likeable,

⁴John Money, The Disabled Reader, p. v.
apparently normal in general comprehension and are often interested in many activities. 1

According to Hildreth a reversal consists of "the lateral inversion of word elements, written symbols or the reading or writing of materials in the sinistral rather than dextral sequence." 2 Wechsler and Pignatelli define reversal "as a 'turning over' or reorientation of a letter or group of letters or words about a particular axis." 3 The term reversal is used by Harris to describe "a variety of different kind of errors, including: confusion of single letters, complete reversal of words, partial reversals, and reversal of the order of words in a sentence." 4 Krise describes reversals as:

... a classification of reading errors in which a change in orientation of a letter or group of letters cause them to be confused with another letter or word because of an acquired identity or similarity in appearance. When as a result of such orientation, a letter or word is read for another, the misreading in question is called a reversal. 5

Laurita classifies reversal errors in the category of directional error and uses terms such as, confused letters or sounds, rotations, inversions, and mirrored images. 6 A more simple definition of reversal is the

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1 L. Teegarden, "Tests for the Tendency to Reversal in Reading," Journal of Educational Research, XXVII (October, 1933), 81.
2 G. Hildreth, "Reversals in Reading and Writing," The Journal of Educational Psychology, XXV (January, 1934), 1.
4 Harris, Increase Reading Ability, p. 370.
5 Krise, "Reversals in Reading," p. 279.
6 Laurita, "Reversals," p. 45.
tendency of an individual to reverse letters or words while reading, writing, or speaking.¹

Reversals are described as strephosymbolia or 'twisted symbols' by some of those who study language disorders. Orton is first credited in the use of the term. He explains it to mean:

...a delay or difficulty in learning to read which is out of harmony with a child's general intellectual ability. At the outset it is characterized by confusion between similarly formed, but oppositely oriented, letters, and a tendency to a changing order of direction in reading.²

Furness designates the term strephosymbolia as the tendency certain individuals have to reverse letters, parts of words, or even whole words.³

Mann quotes Orton as stating that:

...A reversing reader (strephosymbolia) may be applied to describe those school children who demonstrate one or more of the following confusion of single letters; tendency to read words backwards; ability to read mirrored print very well; or the ability to mirror write very well.⁴

Another term closely allied to the above terms is dyslexia. A literal translation of the word is 'bad word'. Anapelle cites a definition from Drake:


A condition of a child of normal or high intelligence who is physically sound and has no history of primary personality disturbance or frank brain damage, but who has abnormally low skills in decoding printed language (reading) and in reproducing language by written form (handwriting and spelling). Such children ordinarily have no difficulty in comprehending and remembering anything which they can read, but they do have a problem in discrimination between similar letters and words. Inversions, reversals, and confusion of words and letters are common at an early age, while at the higher grades, spelling, composition, and mastering a foreign language may present major obstacles in academic failures.¹

It was not the intent of the present writer to delve into the various definitions and subdivisions of the term 'dyslexia'. The purpose of defining the word in this chapter has been to demonstrate its relationship to the reversal problem.

CHAPTER II

REVIEW OF LITERATURE

Introduction

"The apparent relation between reversals and reading difficulty cited by a number of investigators naturally becomes the concern of teachers and educators as well as child specialists and clinical cases."¹

Some of the questions under consideration in the literature are:

1. What types of items are most frequently reversed?
2. What causes reversals?
3. With what frequency are reversals made in reading and writing?
4. What is the consistency of the reversal tendency?
5. What is the relation of the tendency to make reversals to reading success?
6. What is the relation of the tendency to maturity? to experience?

In Chapter II these questions are discussed under three main headings: types of reversal tendencies, possible causes of reversals, and significance of reversals.

Types of Reversals

Orton classifies reversals under two main headings: static reversals (letter confusions) and kinetic reversals (confusion in direction of sequences of letters and words).²

¹Hildreth, "Reversals in Reading and Writing," p. 3.
²Orton, Reading, Writing, and Speech Problems, p. 79.
Since the time of Orton, subdivisions of reversals have been made under these two categories. Woody and Phillips name five kinds of reversals:

1. total reversals (saw-was),
2. letter reversals (b-d),
3. reversals of sequence of words and sentences,
4. digit reversals (7-T),
5. partial reversals (grab-garb).

Hildreth divides reversals under reversals of reading and writing. Included under writing are:

1. single letters and numbers (N-M; 6-9),
2. order of several letters or digits (93-39; on-no),
3. mirror writing in which all separate elements are laterally inverted.

Reading reversals are referred to as:

1. pronunciation (on for no; bread for bear; big for dig),
2. inversion of the order in a phrase or sentence.

Wechsler and Pignatelli noted that reversals are not a simple, but a complicated problem. They added a new dimension to types of reversals by concentrating on axis rotations. Cross orientations include:

vertical axis (b-d); horizontal axis (u-n); and depth axis (N-Z).  

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Kriso cited these two authors as having the most complete list of reversal errors.\(^1\)

A very complete study of reversal types was made by Kennedy. She states that between the years 1929-1954 little advance had been made in understanding the condition of reversals.

It may well be that lack of advancement is due to the fact that little effort has been made to differentiate the types of reversals and to ascertain the frequency of their occurrence among a group of normal children of given age levels.\(^2\)

Kennedy devised a test instrument with which various reversal types could be differentiated and the frequency of their occurrence measured. She divided the types of reversals into four main categories with subdivisions as follows:

1. letter changes
   a) reversal (big-dig),
   b) inversion (big-pig),
   c) inverted-inversion (dig-pig);
2. reversal form (saw-was);
3. mirror image
   a) inversion (mirror above or below),
   b) reversal (mirror to the right or left),
   c) inverted-reversal (page upside down);
4. transpositions
   a) initial letter to an internal position,
   b) internal letter to terminal position,

\(^1\)Kriso, "Reversals in Reading," p. 278.

c) terminal letter to initial position,
d) terminal letter to internal position,
e) internal letter to different internal position,
f) internal letter to initial position,
g) internal letter to terminal position,
h) miscellaneous changes involving several of the others or more than one letter.¹

A simple division of reversals is offered by Dolch. He classifies reversals as: 1) reversal of certain groups of words 'reversed' early in reading development and easily overcome by relearning; and 2) reversals of many words, even new ones, and more difficult to understand and correct.²

Anderson includes inversions with reversals to mean errors such as pod for bop; b for d; and y for n.³

Strang comments on mirror reading and writing. This is not a simple left to right reversal of letters and words as it is when you stand in front of a mirror and try to write your name on your own forehead; it is also near and far reversal. This confusion between visual and body images seems to underlie difficulties in directional orientation, just as difficulties in directional orientation may influence perception.⁴

¹Ibid., p. 161.
²B. Dolch, Teaching Primary Reading (Champaign, Ill.: The Gerard Press, 1951), pp. 350-351.
Gillingham sees another aspect to reversals that is usually not considered.

So much is written about reversals that many teachers are on the lookout for these confusions in the visual memory of the children who have difficulty with reading and spelling. It is not so commonly expected that similar confusions and reversals in recognizing and remembering heard words may also cause extreme trouble.¹

A comment is offered by Lyle in regard to the relationship of reading and writing.

A distinction is made between letter and sequence reversals and this classification may be applied to distortions both in reading and writing. It is commonly assumed that all of these types of distortion form a common syndrome, although such an assumption may not be warranted, since writing involves processes not contained in reading and vice versa. Prognostically it has been found that reversal tendencies in reading and writing diminish with increasing age, sequence reversals persisting longer than letter reversals...²

Possible Causes of Reversals

"The tendency to make reversals is probably not a simple phenomenon with a single explanatory cause, but may result from a variety of causes."³

Some of the earlier observers assumed that the reversal tendency was related to a general mental defect, and they described such cases as partial imbeciles, or if not truly defective, at least not as bright as they should be to accomplish school tasks.

In 1925 S. T. Orton related reversals to brain anatomy. Mintz explains Orton's theory as follows:

A visual shape leaves two memory traces in the visual association center of the Cortex one in each cerebral hemisphere, the two being mirror images of the other. In normal people one cerebral hemisphere is dominant and its trace consistently determines behavior. In occasional individuals, neither hemisphere is consistently dominant and either of the two memory traces may be reproduced on any given occasion, which leads to confusion. Thus according to Orton, b and d being mirror images of each other have identical pairs of memory traces, but in different cerebral hemispheres. If neither hemisphere is dominant both letters are apt to revive either of the same two memory images, and the subject has no way of identifying either of the two letters consistently. The resulting confusion in case of pairs of letters or words where a similar relationship exists leads to failure to learn to read. In view of the outstanding role of the confusion between shapes and their mirror images, Orton gave reading disability a new name, 'strephosymbolia'.

A few years later Orton's collaborator, Monroe, published certain experimental results which were in agreement with the theory. The principal findings supporting the theory were:

1. the common occurrence of reversals of the sequence of letters in reading words and confusions between letters and their mirror images,
2. the tendency of some poor readers to produce mirror writing,
3. confused handedness and clumsiness of some subjects,
4. the excess of reversal errors in the reading performance of retarded readers as compared to normal beginners with the same degree of reading skill,
5. relative superiority of retarded readers in mirror reading, mirror writing, and use of preferred hand.

However in a later study, Monroe as well as other investigators such as Wolfe, obtained results opposed to Orton’s theory. Since the time of these later studies, Orton’s theory has been open to much criticism.

Orton’s theory of visual rivalry from inadequate unilateral occipital suppression is, on the face of it, too speculative to be acceptable. This idea does not explain why dimensions should be confused in a lateral direction only. Nor does it give reason why verbal symbol-arrangement alone is at fault, while surrounding objects, scenes, and pictures appear in normal orientation.

Gates also agrees that this theory is too speculative to be serviceable.

It is stated by Anderson that a few studies have shown mixed preference of hand and eye to be more common among poor readers than among good readers. However, a great many more studies have reported negative results in this regard. "Fortunately reversal problems can be understood without assumption of brain physiology."

In addition, Money believes that the attempt to relate reading disability to cerebral dominance should not be in terms of a theory of

1Monroe, "Diagnosis and Treatment of Reading Disabilities," pp. 201-226.
3M. Critchley, "Topics Worthy of Research," in Dyslexia, Diagnosis and Treatment Reading Disorders, ed. by A. Keeney and V. Keeney (The C. V. Mosby Co., 1968), p. 75.
simple hemispheric rivalry or mixed dominance. "It makes more sense to see the issue as one of the relationship between unilateral versus bilateral representation of functions related to language in its many facets."

In spite of the disagreement of many experts, "Orton has repeatedly restated his theory as recently as 1943 and the theory continues to exert an influence."2

Harris has a modified version of the Orton theory in his belief that "the problem is that of directional confusion resulting from brain damage, slow maturation or from a naturally left-sided child to right sidedness."3

Since the Orton theory many other factors have been sighted as the possible causes of reversal tendencies. Generally the possible causes offered can be summarized as follows:

1. difficulty in the development of rightward eye movements in some left-eyed children; (Monroe)
2. inappropriate techniques in word perception because of difficult vocabulary; (Gates; Zintz)
3. visual defects resulting in regressions; (Anderson)
4. poor motor control; (Monroe)
5. incorrect learning or teaching methods that are inappropriate, such as too early attention to word endings, word families, and whole word methods; (Gates; Scott and Thompson)

3Harris, How to Increase Reading Ability, p. 258.
6. poor auditory memory; (Monroe)
7. normal difficulty in space-form perception as a lack of familiarity with the proper relationship between reversed symbols and their background; (Krise; Strang)
8. developmental or maturational lag and the lack of readiness for reading; (Vernon; Carter and McGinnis; Alexander and Money)
9. developmental dyslexia and the inability to apply knowledge of letters to functional situations; (Vernon; Carter and McGinnis)
10. faulty handwriting techniques; (Gates; Enstrom)
11. transfer to reading of some habits of studying and recognizing objects other than left-to-right progression; (Gates; Money)
12. frustration because of failure to succeed or measure up to expectation; (Laurita)
13. failure to distinguish between similar things; (Fernald; Krise)
14. faulty verbal labeling and verbal rehearsal; (Lyle)
15. directional confusion stemming from confused body positions; (Kottmeyer; Fernald)

Kolson and Kalugar state:

The primary reading disability patient has reversals because of poor directional orientation, whereas the secondary reading disability patient almost without exception is one who scores very low in comprehension.

Among possible causes of reading disability, Deuzat claims that ineffective teaching methods must be included. "Failure to adjust the instruction to individual needs and failure to provide appropriate

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'G. Kolson and G. Kalugar, Clinical Aspects of Remedial Reading (Springfield, Ill.: Charles C. Thomas, 1963), p. 34.
motivational methods seems to be basic to reasons for ineffective teaching."

Commenting on directional difficulties, Anderson points out the evidence of studies that show "good readers excel poor readers in recall of first letters, while poor readers excel good readers in their recall of the last letter in words." 2

In a recent article, Laurita raised questions in regard to conventional reasons given for reversals. He is of the opinion that because of frustration, pupils evidencing reversals have developed a fixation problem similar to that observed in animals that were under a no-escape frustration situation. It would seem that prolonged instruction only serves to intensify the problem, and the stress situation must be relieved by other methods that he suggests. 3

Some authorities are dubious of the causes posed for the existence of reversal errors in children with reading disability. One of these, Woestehoff, says that it is assumed that the problem is one of orientation confusion.

It is interesting to note that reversible words do not become a problem until the child has been exposed to both words. It is of some significance that the problem exists only with words in which a reverse letter order produces a real word, while no may be read as on, jump is never read as pmuj. In addition it is interesting to note that the

1 Dauzat, "Good Gosh! My Child Has Dyslexia," Reading Teacher, XXII (April, 1969), 635.
2 Anderson, "Interpretation of Reversal Errors," p. 182.
3 Laurita, "Reversals: A Response to Frustration," p. 49.
error in such words proceeds in the direction of difficult to easy. For example, ton may be read as not, but rarely will not be read as ton.

In speaking of the eye-hand dominance theory, Fernald states that it is not a prime cause since cases prove otherwise. Eye-hand confusion has been found in severe disability cases and the eye and hand dominance was not changed in remedial work, yet reading improved. Also there have been cases of unmatched eye-hand dominance among good readers.2

Similarly Howards points out that:

Data have shown lack of relationship between various conditions of handedness and the degree of reading efficiency. Eyedness was similarly found to have no association with reading ability as measured by standardized tests and as gauged by the tendency to make reversals.3

It has been assumed that one of the causes of reversals is that the child's eye movements are reversed. Dolch refutes this assumption by stating that "photographs of eye movements prove that the eyes do move left to right, but swing back and forth a great deal and make many regressive movements."4

Woody and Phillips found in their studies that handedness of itself in the groups tested had little or no influence on the types of responses made. Left-handed pupils reacted to the various reading situations just as right-handed pupils did.5

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1 Woestehoff, Students With Reading Disability, p. 17.
4 Dolch, Teaching Primary Reading, p. 348.
Kolson and Kaluger comment on the figure-ground relationship theory.

Reversals and rotations in young children have been explained away as a primitive perception technique which concentrates on figure-ground relationship and distinguishment rather than on position of the figure or letter in space. This certainly can explain p/d and b/c, but it does nothing to explain mirror writing. Others claim that reversals are due to a concentration on the parts of a word and not on the entity. This will explain grill for girl, but does nothing to explain egg for was.¹

Spache disagrees with most theories. He states:

Reversals are not related to handedness or eyedness or cerebral dominance, nor are they indicative of laterality or visual handicaps. In my opinion, their only meaning is an indication of the unfamiliarity of the individual with the particular symbols he is trying to learn.²

Laurita concludes:

The subject of reversals has been treated in myriad volumes by some of the best minds of the last century, but as yet there is no definite answer to the essential cause or multiple variation in effect of reversals appearing during the early linguistic development of the child.³

Significance of the Problem

There is universal agreement that in the early stages of learning, children frequently make reversals in reading and writing. Orton says:

Such confusion is present in practically all children in the very beginning, but the more facile readers very quickly straighten them.

¹Kolson and Kaluger, Clinical Aspects, p. 30.
out and even the reading disability cases, with a little teaching, soon get most of the letters properly associated with their names, with the notable exception of those letters which are similar in form, but reversed in orientation.1

In addition Orton speaks of the very severe cases who have the tendency to sinistrad reading of parts or all of many words. He considers this condition striking enough to demand special attention in a retraining program.2

From observations made in early studies Teegarden concludes that:

...it is evident that the tendency to reverse and confuse symbols is a general tendency of a certain stage of development, later yielding to the habit of reacting to symbols according to position, form, and sequence as distinct elements. If so, an unusual persistence of the tendency may be a major cause of reading disability.3

There is disagreement among authors that reversals cause reading disability. Hildreth says that the "inconsistency of the reversal tendency prevents a conclusion that the reversal tendency is a cause of poor reading."4 Spache also boldly states that reversals are not causal in poor reading or even related to it.5

Kolson and Kaluger comment that most authorities believe reversals certainly become a serious problem in reading when they continue beyond second or third grade.6

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1S. T. Orton, Reading, Writing, and Speech Problems, p. 79.
2Ibid., p. 152.
3Teegarden, "Tests for the Tendency to Reversal," p. 82.
4Hildreth, "Reversals in Reading and Writing," p. 19.
Decandt says, "After these years children who reverse generally do not make normal progress in reading." In agreement are Scott and Thompson who conclude that "some of these children, if not helped at once to overcome these difficulties, may continue to have trouble seeing words correctly throughout life." Gates comments:

It takes some years of experience before a pupil is entirely free from a tendency to make reversal errors. This fact should be kept in mind since teachers now and then seem to assume a reversal error at any time or place is a serious matter. Actually errors are quite typical of the early stages and occasionally errors of this type will persist for a long time.

Vernon says:

Most experimenters have found that if a child is given time to perceive letters carefully, he can differentiate them with fair accuracy by the age of seven years. The real difficulty lies in remembering which of the reversible letter shapes correspond to which sound, and this difficulty persists up to seven or eight years even in normal readers. It has been found that transposition of letters within words and complete word reversals persisted until eight and nine years, considerably later than letter reversals.

Rutherford points out the fact that "reversals are associated as common in the beginning level regardless of chronological age. Until dyslexics read beyond the beginning level regardless of age, a certain amount of reversing should be accepted as normal."

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1 Decandt, Improving the Teaching of Reading, p. 161.
3 Gates, Improvement of Reading, p. 318.
4 W. P. Vernon, Backwardness in Reading (New York: Cambridge Univ. Press, 1957), p. 27.
5 W. L. Rutherford, "What is Your DQ?" Reading Teacher, XXV (December, 1971), 262.
Similarly a comment is made by Ables, Aug, and Looft in their report.

Although we might normally expect such characteristics to fade out in first and second grade, as with all individual characteristics we might also expect a wide variability in the degree to which such characteristics persist. In our developmental timetable, we cannot clearly say at what specific point in a given child’s life he should no longer exhibit such characteristics.

Strang, Carter and McGinnis, and Krise all observed that the potentiality for reversals is never completely eliminated. It is common among individuals at all ages and especially among severely retarded readers. In an experiment with adults conducted by Krise the youngest person was twenty-nine years old. Krise found reversals to be present with unfamiliar symbols and persistence in reversals until proper experience with the new symbols was accomplished.

It has been noted by Anderson that the reversal problem is more prevalent in boys than in girls. Among some of the speculations for this sex difference have been developmental lag, genetic causes, and directional sense development. There have been no satisfactory explanations offered as yet.

2 Strang, Reading Diagnoses, p. 48.
3 Carter and McGinnis, Diagnosis and Treatment, p. 201.
4 M. Krise, “An Experimental Investigation of the Theories of Reversals in Reading,” Journal of Educational Psychology, XLIII (November, 1952), 422.
5 Ibid., pp. 408-422.
Regarding mirror vision and reading, Otto and McNeney state that too many parents are unduly alarmed when they hear that reversals are said to be symptomatic of mirror vision.

An indication of the rarity of true mirror vision is evidenced by the fact that one of the present writers polled a large staff of remedial reading teachers who collectively had over four hundred years of experience in teaching disabled readers. He found only one true case of mirror vision.¹

Both Dolch² and Anderson³ agree that too much emphasis has been attached to errors of reversals as representing the characteristic symptom of reading disability. There is also disagreement as to the percent of reversal cases in reading disability. Monroe⁴ believes about fifty percent of children with reading disability show excessive reversals in their reading errors, while Harris⁵ contends there is about one case out of ten in disabled readers.

**Summary**

Much confusion and varied opinion exists in the literature concerning the types, causes, and significance of reversal errors in reading. Causes of reversals are not firmly identified, yet most authorities admit that they do occur.

While reversals may be attributed to many factors, they are most often related to left-right discrimination ability, incomplete or confused dominance, fusion and eye coordination problems, or immaturity.

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¹Otto and McNeney, Corrective and Remedial Reading, p. 144.
⁴Monroe, "Diagnosis and Treatment," p. 206.
⁵Harris, How to Increase Reading Ability, p. 370.
CHAPTER III

PREVENTION AND TECHNIQUES FOR REMEDIATION OF REVERSALS

Introduction

Diagnosis of reading difficulties is an essential part of classroom instruction. The better classroom teachers are constantly studying the reading strengths and weaknesses of their children... They are quick to detect and correct many learning difficulties before they become serious.¹

One of the difficulties in diagnosis is to determine the tools of both informal and informal procedures. A crucial step in diagnosis is the ability to interpret the significance of the collected data. A decision must also be made to determine the best techniques and procedures to prevent further difficulty, and to eliminate already existing problems.

Chapter III contains a discussion and listing of tools of diagnostic value for the purpose of identifying the presence of consistent reversal tendencies. It also describes possible techniques and procedures to be used in the prevention and elimination of reversals once they are identified and appear to be significant.

Informal Diagnostic Procedures

Orton suggested the use of three or four letter nonsense syllables and combinations constructed of two, three, or four such syllables. The student is asked to read these syllables and is informed that they are

¹Bond and Tinker, Reading Diagnosis, pp. 151-152.
not real words. Orton says:

This technique frequently uncovers a tendency to reversals which has to a considerable extent disappeared from familiar words. While these errors are to be observed by listening to the child's reading, they can be graphically shown in written production to a good advantage.¹

To detect facility in mirror reading Orton suggests producing

print in reverse on the typewriter by inserting a sheet of carbon face-up.

The result will be a mirror copy on the back of the overlying paper.²

In an experiment, Teegarden used a series of teacher devised tests consisting of the following:

1. writing and printing from memory,
2. matching script characters,
3. matching printed characters,
4. copying nonsense characters.

The individual test consisted in noting the starting point and direction and order in which the child named pictures.³

Gates comments on the use of oral tests.

Interpretations are based on comparison of the individual child's tendency to make errors in reading text and in studying the isolated word on comparison with typical or average children. Some pupils are relatively more prone to the error in one situation than another. If it appears in both pronounced forms it is more certainly an indication of a marked tendency than when it appears in only one.⁴

¹S. T. Orton, Reading, Writing, and Speech Problems, p. 80.
²Ibid., p. 82.
⁴Gates, The Improvement of Reading, p. 318.
Other experts such as Hildreth,¹ Durrell,² and Kottmeyer ³ are in agreement that oral reading will often reveal reversal tendencies. Any diagnostic oral reading test or a reading text on the child’s level will be useful. In addition, Kottmeyer⁴ and Harris⁵ supply a list of reversible words to be used as a test. Other lists of words such as the Dolch Word List or the word pronunciation subtest of the Wide Range Achievement Test are good instruments to diagnose reversal errors provided the errors of substitution are recorded.⁶

A final comment on interpretation is given to the diagnostician by Kalugar and Kolson.

Repeated reversals may indicate the child has a perceptual difficulty, so the diagnostician should pursue this lead. It may also indicate a difficulty with comprehension since no child who is comprehending would read, ‘The pig lay in the mud,’ as ‘The dig lay in the mud.’ A clue as to whether or not reversals are perceptually or comprehensively caused can be gleaned from whether or not the child self-corrects his errors. If after reading a sentence with a reversal the child goes back and reads it correctly, there is a good chance the difficulty is perceptually caused. If, however, he fails to correct his errors the difficulty is probably a comprehension difficulty.⁷

¹Hildreth, "Reversals in Reading and Writing," p. 18.
⁴Ibid., p. 69.
⁵Harris, Increasing Reading Ability, p. 582.
⁶Ibid., p. 592.
Formal Diagnostic Tests

The Gaates Diagnostic Reading Tests include a subtest, the \textit{Intra Word Test}, that is used to check reversal tendencies.\footnote{Monroe, \textit{Children Who Cannot Read}, p. 184.}

The Gates Reading Diagnostic Tests contain an oral test of increasing difficulty that has a high incidence of reversible words in the paragraphs to be used. A \textit{Reversals Test} is also included.\footnote{Gates, \textit{Improvement of Reading}, p. 592.}

The Bond-Chall-Hoyt Silent Reading Test has a subtest dealing with the recognition of reversible words in context.\footnote{C. Jechant, \textit{Diagnosis and Remediation of Reading Disability} (West Nyack, New York: Parker Pub. Co. Inc., 1969), p. 296.}


McKee's \textit{Inventory of Phonetic Skill Test} is an additional test that can be utilized in detecting reversals of words.\footnote{M. Zintz, \textit{Corrective Reading} (Dubuque, Iowa: Wm. C. Brown Co., Pub., 1966), pp. 57-58.}


Slingerland's \textit{Screening Tests for Identifying Children With Specific Language Disability}, includes four subtests that are designed to discover the presence or lack of reversals, inversions, and transpositions.\footnote{B. Slingerland, \textit{Screening Tests for Identifying Children With Language Disability} (Cambridge, Mass.: Educational Service, 1962), Tests 1-4.}
Prevention of Reversal Errors

The question arises: what should teachers do when the tendency of reversals exists in early grades? Furness states that "certain educational experts advise that we just wait until certain general and specific maturations have engendered a condition in which reversals are few." ¹

Other writers are not in agreement with this attitude. Enstrom and Enstrom are strong in pointing out preventive measures in regard to reversals in printing and reading.

Preventing problems is always the best cure, therefore reflects the best teaching. Remedial approaches in all areas imply learning failure from the start. In preventing reversals... the teacher must exercise extreme care in all initial presentations. This is true because beginnings, like first impressions, whether correct or otherwise, tend to persist. Instead of using all our energies to battle wrong habits, those of us who teach should devote more time and thought to correct introduction...²

Vernon cites Potter, who found that confusions due to reversals did not die out naturally, but it was necessary to teach children the importance of the order or direction of letters in the word.³

If the tendency of reversal can be measured in the young child, Teegarden believes it may be possible to select those individuals with an unusually strong degree of the tendency and give them special help in overcoming the difficulty before the school has expanded several years of instruction by routine methods which prove unsuccessful.⁴

²E. Enstrom and D. Enstrom, "In Print Handwriting; Preventing and Solving Reversal Problems," Elementary English, XLVII (October, 1939), 763-764.
³Vernon, Backwardness in Reading, p. 29.
⁴Teegarden, "Tests for the Tendency to Reversals," p. 82.
Spalding comments:

... in any class a large percentage of the children inherit a tendency to reverse or to confuse the sequence of letters in words. This tendency is independent of a child's intelligence. If this is caught early before the habits are fixed, it can soon be corrected.

Since one of the possible causes of reversals is directional confusion, this factor needs some attention. Careful initial instruction can prevent the formation of habitual orientational confusion. "The classroom teacher should constantly be on the alert to detect orientational confusions and give the appropriate instruction." 2

Zints is in agreement that awareness of the problem and a few constructive techniques to help establish left-right orientation will be helpful and wise in order to prevent any difficulty later on. 3

In a recent study, Jackson found that initial confrontation with English Orthography needs to be undertaken with painstaking effort to establish one visual symbol before introducing the second. For example, when b and d have been presented and mastered individually, the method of superimposition would appear to heighten the perception of the difference. 4

A statement by Teegarden in her study suggests that children who reveal the strongest reversal tendencies in the early grades may need

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3 Zints, Corrective Reading, p. 58.
more training in observation; copying; manipulation of forms of various kinds; matching; drill and games emphasizing right and left; picture stories and sequence of pictures; and meaning of left and right. "Any activity that requires the child to give specific stimulus probably will be found helpful for children who have a strong tendency to reverse and confuse symbols." ¹

Likewise, Hester gives the following suggestions for training young children:

Place a row of forms on a flannelboard and let children remove from the row those forms that are not exactly alike... Take note of a child who is unable to detect reversed figures in each row. This child needs more practice and experience in observing from left to right lest he reverse letters as b and d when he reads.²

Hester further suggests that a kinesthetic exercise is a very effective way to teach children how to examine a word. If the habit of viewing a word from left to right is thoroughly established, the chances for making errors such as saw for saw and left for felt will be reduced to a great extent. Tracing the word with fingers, then crayon with careful supervision is suggested.³

The left-handed child may seem to be prone to making reversals and needs special consideration according to Enstrom and Enstrom.

In this world of writing and reading the predominance in movement is left to right; hence any child who is left-handed needs to be watched and helped initially to make sure that the desired hand-writing and reading directions are correct from beginning efforts... Too often the child begins on his own with no one to tell him how

³Ibid., p. 120.
to hold his pencil correctly, where to begin a letter, in which direction to move and what sequence to make the parts... There is no easy 'growing out of it' as some educators suggest. Mild habits become more firmly fixed with every repetition.\textsuperscript{3}

The authors further state that the elimination of the $b$ and $d$ confusion in handwriting, strengthens reading by alleviating this confusion in reading situations.\textsuperscript{2}

In an extensive study, Stevenson and Robinson found that even bright pupils who were right-handed but left-eyed tended to move from right to left before reading instruction.

It is imperative that First Grade teachers place emphasis upon the fact that to read English, pupils must begin at the left and move to the right...sufficient practice should be given in using this order of progression to establish a pattern for those pupils who tend to move in the opposite direction.\textsuperscript{3}

General Procedures for Overcoming Reversals

"In general, the best remedial instruction is simply the best classroom methods used with very exact adjustment to the needs of the individual."\textsuperscript{4}

Reversal of words, parts of words, and the order of words in sentences often indicate that the child needs training to develop a consistent left-to-right sequence as it applies to reading. A strengthening of all word recognition techniques and left-to-right blending might well be an effective cure for reversals.

\textsuperscript{1}E. Enstrom and D. Enstrom, "Reading Help for Lefties," Reading Teacher XVI (October, 1971), 44.

\textsuperscript{2}Enstrom and Enstrom, "In Print Handwriting," p. 763.


\textsuperscript{4}Gates, The Improvement of Reading, p. 319.
Some of the general suggestions that have been offered to help overcome reversals in the normal classroom situation are as follows:

1. Color or underline the first letter in the word that causes difficulty.
2. Draw an arrow pointing to the right under the word or at the top of the page to direct all work in the correct direction.
3. Uncover words slowly from left-to-right with a card or the use of a zipper.
4. Erase words at the board one letter at a time from left-to-right.
5. Use mnemonic devices, anagrams, and crossword puzzles.
6. Use monosyllabic words by putting each letter in a block and number the blocks in a left-to-right direction.
7. Underline the first letter of confusing words in the color green for 'go' and the last letter in red for 'stop' as in traffic signals.
8. Put a green dot with a marker on the left hand of the pupil and a small red dot on the right hand.
9. Other color or ideas can be used such as those found in suggestions by Rupert.¹
10. Stress that the left side of the word is the beginning of the word and the right side is the end. This technique will be useful only if the concept of right and left is mastered.
11. The child can wear a large button on his left side and a ring on his left finger to remember which side to start when he reads and writes.

12. The teacher's use of hand movements from left-to-right under the reading, especially when large print is used, for example at the blackboard or chart, can encourage correct direction.

13. Children could engage in left-to-right tracing exercises using finger tracing, crayons, and finally pencils.

14. Reading the calendar from left-to-right may be helpful.

15. Following choral reading can be a practice of correct direction in reading.

16. Write only one word on a line with the first letter always at the extreme left edge of the paper.

17. Have children make moving pictures or T.V. with pictures moving from left-to-right.

18. In activities such as art make designs from left-to-right with the children.

19. Teachers should stress sounding out of confusing words always from the first letter rather than looking at the end of words or other parts.

20. It is a good idea for children to work at the blackboard for easier teacher observation of written work and immediate correction of reversal errors.

21. Arrange pictures in left-to-right sequence and tell the story in that order.

22. A typewriter could be used to stress left-to-right direction.

23. A magnetic board with three-dimensional letters may be used to spell troublesome words from left-to-right.

24. Write words in sand or salt or use sandpaper letters for tactile learning, saying each letter or sound as it progresses from
left-to-right.

25. Use a pegboard for practice in putting pegs in a left-to-right direction.


27. Construction of a personal dictionary and exercises requiring the use of guide words may also be employed.

28. Mechanical devices such as speed reading machines are useful to demonstrate the reading sequence of moving left-to-right.

29. Teach left-right games such as "Simon Says", "Lobby Loo", or "Did You Ever See a Lassie"?

30. Play memory games such as putting out three or four objects to look at, cover, and then have a child try to name them in left-to-right order. An overhead projector could be useful in this way with distinguishable opaque objects or transparencies.

31. Guessing games might be employed. For example: pick up an object, hide it in one hand, and then players guess which hand, left or right has the hidden object.

32. Visual sequential memory exercises can be utilized to train children in perceiving correct sequence of letters in words. These exercises might include: recalling objects removed in a sequence; reproducing sequences of objects from memory; remembering letters and numbers in sequence; copying symbols, letters, and numbers in sequence after a ten-second exposure; symbol and directional matching.

33. Teacher-made games using reversible words can be utilized in many ways. It is a good practice to have children spell the word being
used to give greater awareness of left-to-right procedures of letters and sounds in words.

34. Rhymes can be constructed using pairs of reversible words.¹

35. Demonstrate the change of h to k in a word. For example had becomes had.

36. Show the child that he can change small h to k by adding another loop on the top in the same direction.

37. Teach letters in two groups: those that circle to the right or clockwise (B, P, J, p, h, j, m, n, r, i) and those that circle to the left or counterclockwise (c, a, d, q, f).²

38. Children could follow oral directions on a tape recorder for left-to-right written exercises.

39. The teacher can give left and right directions when pupils are secure enough, for example, "Touch your left ear with your right hand."

40. Visual perception exercises as found in beginning reading activities can be helpful to give practice in correct observation of letters and words.³

41. Readiness games with directional emphasis are useful and fun.⁴

42. A stamping set may be useful to print words. This may be a good approach for pupils who find writing difficult.

¹L. E. Scott and J. J. Thompson, Phonics, pp. 219-220.


A word of caution is offered in regard to the practice of demonstrating reversible words to pupils. It will depend on the good judgment of the teacher whether or not to use this technique. Certain individuals may like the novelty of this new-found discovery and may try it out on many other words for amusement. In addition to this problem, it could cause anxiety in some children who fear making this type of error. A child might get into the habit of looking at a word one way, saying it and looking at it the other way just to check up.¹

Teachers are cautioned also against undue stress and overemphasis on the correction of reversal errors. This correction should not be made at the expense of the total instructional program.²

Use of the typewriter has been recommended, but Anderson concludes that although directionality is practiced, transposition of letters and changes in word order which often occur would not be overcome by this technique.³

Remediation Procedures for Specific Cases of Reversals

The elimination of reversals in reading is not easy. No one method has proven completely effective. June Orton emphasizes the importance of day-by-day observation of the pupil's language difficulties, with flexible procedures to meet individual needs, rather than a fixed formula or method of remedial work.⁴

¹ Gates, The Improvement of Reading, pp. 327-328.
² Carter and McGinnis, Diagnosis and Treatment of the Disabled Reader, p. 206.
Reversal tendencies are "symptoms which, in cases of severely retarded readers, should be investigated. Treatment following diagnosis should not be too difficult to apply." 1 Zints says that "if the habit of reversing, or being utterly confused has persisted through several years, it will be necessary to erase the old habits and then to form new ones." 2

Some techniques used for more persistent cases of reversals have been offered by various authorities of reading disability. These procedures are generally not used in ordinary classroom presentations, but with clinical or remedial cases.

Orton suggests that nonsense material is particularly helpful with those children who already learned to recognize many short words by sight, "but who are insecure at this and apt to misread words by the substitution of another somewhat similar general configuration." In this case the child must solve the words by sounding them without attempting to produce anything with which he is familiar. 3

In contrast Krise in 1952 concluded from his study of reversals in adults, that:

...When a pupil is found to be committing reversals in reading, his remedial instruction should be confined to the specific letters and words he tends to reverse, rather than to secondary materials such as digits and nonsense symbols, or to attempts to overcome a general

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2 Zints, Corrective Reading, p. 60.
deficiency or establish a particular capacity, such as particular visual habits, motor coordination, and auditory discrimination.\(^1\)

It was suggested that remedial work in reversals be centered on the up-and-down, backwards-and forwards, and top-and-bottom characteristics of letters and of words reversed in their figureground relationship.\(^2\)

Zints\(^3\) and Monroe\(^4\) earlier agree that cursive instead of manuscript writing be used wherever possible because all the letters are joined and there is less possibility of reversals occurring. The letters b, d, p, q, u, n, m, w, f, t and others can be traced by writing the script form of the letter over the printed form to verify correct formation and recognition.

In extreme cases of reversals, the use of Braille type raised dots can be helpful. In this method the pupil can feel the dots with eyes closed until he can tell only by touch what letters are present and can distinguish one from another. This additional cutaneous cue was found to be helpful in correcting words most frequently confused.\(^5\)

For cases of unusual difficulty Gates offers the following suggestions:

1. Follow the teacher's finger or a pointer in the correct left-to-right direction.
2. The teacher should print with larger space between lines and also larger space than usual between words.

\(^1\)Krise, "An Experimental Investigation of the Theories of Reversals," p. 422.
\(^2\)Ibid., p. 408.
\(^3\)Zints, Corrective Reading, p. 60.
\(^4\)Monroe, Children Who Cannot Read, pp. 127-128.
\(^5\)Ibid., p. 128.
3. Teach the child to observe an unfamiliar word from left-to-right then jump back to the beginning and proceed.

4. Encourage context clues and meaning in sentences.

5. Let the child use his finger, then guide him to do without it when he is more confident.¹

Dolch believes it is a good exercise to have the child go through part of a story, not reading but sounding the beginning letter of each word. This practice is to establish the habit of noticing beginnings. Another practice would be to count the words he has read thus causing him to follow the line from left-to-right. If the child has a very strong case of eye wandering it is proper to have him point for a time to each word as he reads it.²

Harris is in agreement to encourage the use of a pencil or finger as a guide in reading along a line. "While this practice is to be discouraged in good readers, it is helpful as a means of teaching the proper direction for eye movements." ³

In addition Harris suggests that pupils who are mirror readers be allowed to read material in a mirror which causes the print to be seen upside down. After a few weeks of this practice with a mirror, they often can read normally without its use.⁴

¹ Gates, The Improvement of Reading, p. 319.
² Dolch, A Manual for Remedial Reading, p. 66.
³ Harris, How to Increase Reading Ability, p. 317.
⁴ Ibid., p. 256.
Frostig offers these suggestions for the pupil who suffers from kinetic reversals:

1. Copy beads on a string and relate them to letters in words.
2. Copy and produce patterns.
3. Use a bridge between the first letter or digraph and the rest of the word. (b~ig; sh~elf)
4. Write a word from memory after it has been exposed for a short time.¹

Monroe states that:

The remedial treatment for reversals, regardless of the theory accepted, is based on simplification of reading material to the point where the child can read as accurately as possible, and practice exercises stressing direction in which hand and eye movements are coordinated.²

The kinesthetic method has been advocated by various authorities as a significant method in eliminating persistent reversal errors. "The need for tracing and writing is greater for children who reverse letters than it is for those who make other types of letter errors and more intensive drill is usually necessary before the confusion is eliminated."³

Among the most prominent methods are the Gillingham-Stillman and the Grace Fernald methods. The Gillingham-Stillman retraining method based on Orton's theory is as follows:

1. Show letter symbol to the pupil who repeats its name after the teacher. The sound of the letter is made by the teacher and repeated by the pupil. (visual, auditory, and speech kinetics)

¹ Frostig, IIDisabilities and Remediation in Reading," Academic Therapy VII (Summer, 1972), 378.
² Monroe, "Diagnosis and Treatment of Reading Disabilities," p. 209.
³ Harris, How to Increase Reading Ability, p. 371.
2. The pupil watches the teacher make a letter correctly and traces over the model in the correct direction, copies it, writes it from memory, then closes his eyes and writes the letter. (visual and kinesthetic)

3. Stimulus response drills such as:
   a) The teacher shows a phonogram; the pupil gives its name.
   b) The teacher forms symbols with the pupil's hand while he looks away and gives the letter name.
   c) The teacher dictates the name of a letter and the pupil writes the letter.
   d) The teacher gives the letter name and the pupil responds the sound orally.

   The drill is repeated with the letter sound instead of the letter name. Flexibility is used for individual cases and needs.

4. Letters are grouped to be learned in order of difficulty, the increase being: a, b, f, h, i, j, k, m, p, t, (vowels are short).

5. Letters are blended into words according to consonant-vowel-consonant pattern. Vowels and consonants are color coded cards.

6. Spelling is the next step, pronouncing each sound carefully as the word is given:
   a) pupil repeats word,
   b) pupil names letters in a word,
   c) pupil writes the word naming each letter as he forms it,
   d) pupil reads back what he has written.

7. When these easiest letters are learned the pupil progresses to more difficult combinations of letters following the same procedures.¹

¹June Orton, "The Orton-Gillingham Approach," pp. 139-140.
Gillinham prefers cursive to manuscript writing in regard to reversal discrimination.

When it is required to make a distinction between two already confused objects, ideas, sounds, etc., the two must be confronted with each other and their differences made articulate. There can be no distinction between one thing! All the above difficulties are avoided by cursive script.¹

Fernald describes her method as tracing and writing the word while pronouncing it. This requires careful thinking of direction before letters are formed. In regard to reversals she states:

We find that our reading cases have failed to make progress in discrimination that eliminate this particular error (reversals), but we also find that the use of suitable methods leads to rapid, correct perception.²

Miller makes a summary statement comparing the Gillingham -Stillman and the Fernald methods.

If a disabled reader seems to read best by a kinesthetic (VAKT) method the Fernald Method or the Gillingham-Stillman Method can be used. These two kinesthetic methods are somewhat similar except the Fernald Method emphasizes teaching words through the tracing of syllables, while the Gillingham-Stillman Method emphasizes teaching of words through tracing single letters...The Gillingham-Stillman Method is recommended for use with children who have dyslexia. This approach is good for them because it uses all the senses. However, in using this method with dyslexic children the teacher should remember that each of the phonetic generalizations must be overlearned so that each concept is thoroughly learned before a new one is presented.

The Fernald Method seems better to use than the Gillingham-Stillman Method with children who learn best by a kinesthetic method since it uses syllables instead of isolated sounds. In the Gillingham-Stillman Method, the sounds are isolated and therefore distorted, making the blending of the word quite difficult.³

¹Gillingham, Remedial Training for Children, p. 57.
²Fernald, Remedia11 Training, p. 177.
Gates says that the tracing activity may be used only so long as needed to get pupils started reasonably well, and then it may be dropped and the pupils allowed to continue by purely visual study.

There have been some recent and interesting methods suggested to help alleviate reversals. One of these is presented by Blau and Blau: "...remedial procedures often confuse and obscure the very learning they are attempting to bring about." At times, he believes, there is a conflict in modalities of learning. Children may learn what letters look like, but find it exceedingly difficult to learn what they sound like or vice versa. To avoid confusion a method of blocking the conflicting modality was carried out. If the visual modality was identified as the critical one, the non-visual ART method was employed as follows:

1. Eyes are covered or closed.
2. The visual modality is compensated by other modalities such as tracing words on the student's back as he traces the words simultaneously with his fingertips on a table in front of him.
3. Voicing the letters by the student as he traces them focuses attention on mental images of the word.

Once a word has been mastered by this non-visual method it seems to be handled by the student normally. Blau and Blau conclude that the visual modality is not helpful at all times to all students.

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Another program called Individual Letter Reversal Reduction (ILRR) was initiated by Hicks. Guidelines for this program are as follows:

1. Work with one letter at a time.
2. The chosen letter should be introduced through as many sensory channels as possible with emphasis on the student's strongest modality.
3. Reading material should be as uniform in type of print as possible.

The program of remediation is derived from an operant model to reduce stress of the student who has failed for so long. Directions for this remedial program are as follows:

1. A minimum of instructor verbalization is necessary.
2. With both correct and incorrect responses, the student receives knowledge of results.
3. The student can be informed of errors briefly and nonverbally.

An associative stimulus is used in the place of verbal explanation, for example:

If letter b were selected the teacher might put a small spot of ink on the back of the student's right hand to remind him that the loop on the lower case manuscript b faces toward the spot. While reading, the student's hands should be placed on each side of the page to facilitate recognizing the proximity of the loop on b to the spot.\footnote{J. Hicks, "Individual Letter Reversal Reduction," in \textit{Building Spelling Skills in Dyslexic Children} ed. by John I. Arena. (San Rafael, Cal.: Academic Therapy Publishers, 1968), p. 86.} No mention has been made to the student in regard to the spot being on the student's right hand. After the association between the spot and the direction of the loop on b has been established the concept of right may be introduced. After the placing of the spot on the back of the student's
right hand, the student should be directed to read orally. When the first error and subsequent errors are made involving \( \mathbf{b} \) and \( \mathbf{d} \) the instructor might lightly tap a pencil on the top of the desk to remind the student of the error made. In addition to this 'negative' reinforcement the instructor should use positive reinforcement in the form of verbal praise for each correct response to either \( \mathbf{b} \) or \( \mathbf{d} \).\(^1\)

In a recent lecture Kass referred to reversal problems in reading in relation to the learning disabled child. She spoke of reversal patterns as habits which need double remediation. Habits of confusing letters such as \( \mathbf{b} \) and \( \mathbf{d} \) are overlearned. Kass believes it is important to start from the top and work back through the concept. In order to facilitate learning, a change in the situation needs to be made so that new habits can be formed. The following ideas were offered:

1. For a time write on newspaper want ad section, wallpaper, or similar materials to provide a change in background for reversible letters and words.
2. Use of another code system for awhile may be helpful.
3. Change the learning environment. For example, if the student is accustomed to being in a classroom setting, change to a living room or other location.
4. Mask out different channels of learning and note the preferred one.
5. Combine different channels of learning if helpful.\(^2\)

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\(^1\)Ibid., p. 87.

According to Laurita, there has been "disappointing progress in the development of procedures or materials which can promise any but guarded and ambiguous offers of help to overcome reversals." He concluded that success resulting from direct efforts at eradicating the effects of problems as reversals was disproportionate to the inordinate amount of time spent in efforts. ¹

Since direct remediation is sometimes met with resistance, Laurita has taken another course of action to solve the problem. Direct efforts are to be replaced by the establishment of "an emphasis on improvement of the learner's overall directional orientation with regard to the spatial and temporal aspects of language symbols." ²

In addition the following program has been recommended:

1. When a reversal error is made the student is told the correct response immediately.

2. All possible effort is made through carefully constructed exercises so that the student does not have opportunities to make reversal errors.

3. The teacher is alerted for opportunities to supply the correct form of the previously reversed sounds, letters, word parts, or words before they occur to avoid confused responses and their repetition and reinforcement.

The result of this program should be observable improvement in remedial effort.

¹R. Laurita, "Reversals: A Response to Frustration?", p. 45.
²Ibid., p. 46.
Summary

New ideas for the prevention and remediation of reversal errors in reading and writing continue to be questioned and researched. Chapter III has been an overview of diagnostic procedures and varied approaches to prevent and remediate reversals in reading. Authorities do not agree on any one method of remediation and point out strengths and weaknesses of several procedures.

It is important for any teacher who is concerned with the problem of reversals as well as other reading errors occurring in disabled readers, to know many different techniques. While some procedures are appropriate for any classroom situation, other techniques are to be utilized mainly for persistent cases of reversals or specific problems.

Since procedures to be followed for overcoming reversals will depend mainly on teacher judgment, careful diagnosis should be made, as well as evaluation. Knowledge of the strengths and weaknesses of each procedure to be followed is of major importance so that the best methods can be employed for each individual need.
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