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CLINICAL SERVICE

KALAMAZOO, MICHIGAN
1937 - 1938
A Clinical Approach to the Problem of Reading Adjustment

By HOMER L. J. CARTER,
Director of the Psycho-Educational Clinic

Comparatively large numbers of children have difficulty in learning to read. Investigation\(^1\) shows that 10 to 12 per cent of the school population have serious reading disabilities. Similar data are given by Betts\(^2\) who reports that 10 to 15 per cent of all children in the primary grades have reading deficiencies which interfere with their school progress and there are data to indicate the persistence of these disabilities from one grade to another. Attempts to study reading deficiencies from the point of view of educational methods have not been entirely successful. The problem is further complicated by the fact that the teacher does not have access to the clinical devices and materials necessary for the study and analysis of the individual's reading errors, his capacities, and abilities. Doubtless, facts are available in the subject matter areas of psychology, medicine, education, and applied optics which are pertinent to this clinical problem. Unfortunately these findings have not been adequately integrated and made available for practice.

Several Factors Related to the Development of Reading Ability.

Without doubt, no one factor can be expected to account for all types of reading disabilities. Numerous causes may make up a pattern of the individual's reading deficiency and in a single case several may be dominant and in other instances may have less significance. Several inter-related factors which may be of importance in the hierarchy of causes are maturation, vision, hearing, kinesthesia, environment and language, social age, and endocrine dysfunctions. Maturation is probably the most important of these factors, for each of the others is an aspect of it or directly related to it. This relationship will be discussed somewhat in detail.

Maturation

Maturation in relation to reading embraces certain physiological and psychological aspects. Every living cell has a capacity to develop under stimulation. Cells mature and are sustained in growth by metabolic activity. As cells mature in relationship to other cells, an organ or structure is formed. The maturity of this organism in relation to other structures carries with it the capacity for psychological reaction. Reaction capacities for various structures do not mature at the same rate. For example, the capacity to breathe matures before birth, and the capacity to walk matures after birth. Birth is but an event in the maturation process. Courtis\(^3\), in discussing maturity, says,

"Children succeed in school work in general in accordance with their development or maturity. The level of their development at any age level is fixed by hereditary factors which are measured roughly by the intelligence tests, while the training contributes a small but distinctive amount in addition. These factors account for 90 per cent of the changes in children. Other factors, such as home influence, health, etc., cause variations in individuals, but on the average all such factors combined

\(^1\)Monroe, Marion. Children Who Cannot Read, The University of Chicago Press, 1932, p. 17.
\(^3\)Courtis, S. A. Why Children Succeed, Courtis Standard Tests, Detroit, Michigan, 1925, p. 194.
do not displace the average child more than 10 per cent from his predicted place."

Monroe6 and others have shown that a child should be at least six years and six months old mentally before formal work in reading is attempted. Hinshelwood7 indicates that defective cerebral development seriously interferes with readiness to read. He suggests that children of this classification can be taught and would develop reading ability if patience and persistence were employed. Orton8 reports that some children have a tendency to make reversals and that this confusion or tendency to read from right to left is probably due to delayed cerebral development. This may explain the report of educators that children with marked tendencies to make reversals frequently recover upon becoming more mature. Generally, a child who is sufficiently mature will show an active interest in learning to read with very little, if any, direct urging on the part of the teacher or parents.

Vision

It is known that during the process of reading the eyes do not move smoothly and continuously over the line of material being read. Eye movement in reading consists of a series of rapid, forward jumps and of periods of fixation at which point perception actually takes place. The trained reader does not fixate upon every letter or word, for meaning is grasped in phrases or even larger groups of words. For example, the words butterfly and gingerbread are easily comprehended from the following incomplete forms: b-t-fly, g-g-b-d. In other words, meaning is the resultant of preception plus content. This concept advanced by Witasek9 may be restated in the following manner. Act plus content points to the object or meaning. The organism sees g-g-b-d and because of attention to images and percepts, resulting from previous experiences, sees gingerbread. If the act of perceiving depends upon ocular skills which have developed to different levels of competence, reading ability will be directly related to maturation. Reading is probably not the purely psychological matter it is often thought to be, for it is closely related to the skill which a person has acquired in using such muscles of the eye as the superior oblique, superior rectus, internal rectus, inferior oblique, inferior rectus, and the lateral rectus. Visual acuity is important, for lack of clear retinal images, due to defects in the refractive mechanisms of the eye, may retard progress in reading. Such factors as near and far point fusion, vertical and lateral imbalance, stereopsis, suppression, and other ametropia are also to be considered. Eye dominance, Miles10 declares, is assuming greater importance in ophthalmology and applied optics. Monroe11 and others claim that mixed sinistrals and mixed dextrals are more apt to make reversals than either the pure dextrals and sinistrals, and that there is a tendency for left-eyed children to make more reversal errors than right-eyed children. However, Plotrowski12 explains that as vision is a bilateral function of the brain, the cerebral dominance theory is not needed to explain the difficulties of beginners in reading. It is possible that further study of eidetic imagery may furnish data concerning perception and the general problem of maturation.13

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9 Williams, R. D. and Bellows, R. M. *Background of Contemporary Psychology*, H. L. Hedrick, Columbus, Ohio, 1935, pp. 102-105.
11 Monroe, M. *Children Who Cannot Read*, University of Chicago Press, 1932, p. 86.
Hearing

Hearing may be regarded as a re-enforcement to vision. Thorndike\(^2\) shows that instead of antagonism between imagery of one modality and that of another, there is a close correlation. Individuals cannot be classified as visualizers, audiels, or motiles. Several investigators declare that children react differently to phonetic training.\(^3\) Some require very little if any formal work in phonetics to gain skill in word recognition. Others after much phonetic training are quite helpless. Auditory memory span, the ability to fuse sounds into words, and the ability to discriminate between sounds are important factors in learning to read. Auditory acuity like visual acuity should be given careful consideration in dealing with the non-reader.

Kinesthesis

In learning to read, kinesthesis is an important supplement to vision and hearing. In fact, the auditory image appears to be associated with the actual innervation of the larynx, that is, with kinesthesis. Betts\(^4\) suggests that tests of auditory discrimination also provide an index to the child's ability to pronounce words correctly. Kirk\(^5\) has demonstrated that teaching reading with the added tracing factor is superior to the conventional sight method in terms of retention for subnormal or immature subjects. However, Dearborn\(^6\) states that the tracing method of Fernald may in certain cases aggravate rather than remedy the condition unless it is carefully managed.

Language and Home Environment

It is possible that language is a factor contributing to certain reading difficulties, for children from homes in which a foreign language is spoken frequently have limited vocabularies and problems of articulation and enunciation. Hilliard,\(^7\) in an unpublished study of kindergarten and first grade children, found that children coming from homes of limited educational and cultural advantages did not make as rapid progress in reading as those from a more fortunate environment.

Social Maturity

Furfey\(^8\) shows that the developmental age or social age of an individual increases from birth to maturity and may be measured in any stage of its development. Doll\(^9\) has recently constructed a similar scale. These devices indicate that there may be a slowly developing process of maturation which cannot be measured in terms other than the individual's interests and activities. Studies of the reading interests of children seem to substantiate this point of view.

Endocrine Dysfunction

Gordon and Kuskins\(^10\) report the collection of 958 cases in which the relationship of endocrine disorders and mental retardation was studied. Of 292 children of normal mentality, 263 had endocrine disturbances and 29 had none. Of the 666 children who were mentally retarded, 266 had endocrine dysfunctions and 400 did not. However, 55 per cent of the 529 children with endocrine disturbances of both the intellectually normal and mentally retarded group were either retarded in school or were in special classes for


\(^{16}\)Hilliard, G. H. A Study of Certain Environmental Factors in the Development of Reading Readiness.


remedial instruction. Of the 529 children suffering from endocrine disorders, 179 were diagnosed as having either thyropituitary or anterior pituitary insufficiency. Their range of intelligence stated in terms of the I.Q. was from 61 to 131. Rowe\(^2\) shows in a similar study that of 650 individuals less than seventeen years of age who were examined for evidences of endocrine dysfunctions, 374 had such disturbances and 276 had none. In both of these studies a marked predominance of pituitary disorders was reported.

**The Pituitary Gland**

The pituitary gland has three distinct parts, (1) anterior lobe, (2) posterior lobe, and (3) pars intermedia. The structure is about the size of a very large pea and fits into a small pocket (sella turcica) in the bony floor of the cranium in the very center of the head. This body is connected with the brain stalk but has nothing to do with the brain functions.\(^2\) Diagnosis of pituitary dysfunctions is aided by an X-ray of the skull. Types of the sella turcica may be classified into five groups, (1) generally contracted with clinoid processes that close in the cavity, but with no erosions; (2) generally contracted with evidences of erosions; (3) normal size of sella without erosion; (4) normal size of sella with marked erosion; (5) abnormally large sella with or without erosions.

The anterior lobe is believed to control connective tissue growth in the body, especially the skeletal, and to control the activity of the gonads. The posterior is credited with properties stimulating metabolism and maintaining blood pressure. Timme\(^2\) claims that it increases peristalsis and stimulation of the sympathetic nervous system. The pars intermedia produces a hormone which is the basis of diabetes insipidus. The gland as a whole has a direct influence in genital development.

**Inter-relation of Pituitary and Other Glands of Internal Secretion**

Other endocrine glands partially compensate for deficiency and surplus in pituitary secretion. The thyroid compensates for the control of metabolism in connective tissue such as skin, hair, and joints. The adrenals partially control the maintenance of blood pressure and tone of smooth muscle fiber. The gonads are linked to the pituitary and increase and decrease in their activity with that gland. The pancreas opposes the pituitary as is shown by the contrary effects in sugar tolerance. A pituitary deficiency is one in which the compensation by other glands is not sufficient to overcome the original disturbance.

**Hypopituitarism**

The systemic symptoms due to the deficient secretion of the pituitary gland are (1) increase of body weight, (2) increased tolerance for sugar, (3) a lowered body temperature, and (4) a sluggish mentality with slowness of movement and diminished sexual activity. In adolescence there is an undeveloped sexual growth, lack of pubic hair or a tendency in its distribution similar to that of the opposite sex. Young boys develop mammary glands with feminine contour. These characteristics make up the Froelich syndrome.

Hypopituitarism during the pre-adolescent period is characterized by a dryness of the skin, subnormal temperature, slow pulse, and low blood pressure. There is frequently a history of enuresis. Social maladjustment, a childish attitude, and an unwillingness to put forth effort is frequently reported. The child is backward at school and is apt to lose control at the slightest difficulty. At times he is a victim of compulsion neuroses. Mateer\(^2\) claims that pituitary dysfunction may cause physiological immaturity.

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\(^1\) Rowe, A. W. "A Possible Endocrine Factor in the Behavior Problems of the Young," *Amer. J. of Orthopsychiatry*, 1:451, 1931.
intellectual retardation, changes in emotional attitude, special disabilities such as speech defects, eye disturbances, motor incoordination and reversal tendencies. Mateer analyzes one hundred pituitary cases old enough to have reading experiences and shows that no matter how high the intelligence of the patient, he is relatively poor in reading. She claims that 90 per cent of the pituitary dysfunction cases studied present marked reading defects.

With the completion of this brief summary of several factors related to the development of maturation and reading ability, the writer will summarize a clinical history of reading disability in which a hypopituitary insufficiency was evident. Actual names, locations, and some of the details have been deleted.

A Clinical Problem

Several years ago Bill, a big, stout, overgrown boy, was brought to the clinic at Western State Teachers College for study. The inquiry was “Why is Bill retarded educationally?” The boy was thirteen years and eleven months old. His mental age as determined by the Stanford Binet was thirteen years and six months and his median mental age as measured by the Pintner-Paterson Performance Tests was fourteen years. His average reading grade level as shown by several reading tests was that of a child just entering the third grade. Bill’s actual grade placement at the time was five months in the sixth grade. His expectancy grade as determined by the Monroe procedure was seven months in the eighth grade. In other words, the problem became, “Why is Bill such a poor reader?”

Family History

Family history in general was negative. Both father and mother reported the freedom of their families from amentia, dementia, emotional instability, and endocrine dysfunction. The family physician, who had known both parents for years, substantiated their claim.

Home Conditions

Bill’s father was a traveling salesman who spent practically two-thirds of his time away from his family. Home conditions were superior as far as physical comfort was concerned and there were no evidences of marital difficulties. When the case history was taken the father was 45 years old and the mother 48. In addition to Bill, three sisters whose ages were 24, 22, and 19 made up the family. The mother was the dominant member of the household and was much concerned with the conduct of her only son. He had been pampered and given only limited opportunity to develop a sense of independence. In fact, in the absence of his mother, his three sisters assumed the responsibility of his management and control. The books, games, and play equipment found in the home were those for girls and were of little concern to a growing boy of nearly 14 years.

Developmental History

Birth was reported by the parents as normal. Bill walked at ten months and talked at sixteen months. The child had been well nourished and the only illnesses reported were those of whooping cough and measles. Development of sex organs had not been normal. The physician reported that Bill was developed sexually at the age of thirteen years and eleven months only as well as a boy of four or five years. A long history of enuresis was apparent in the case.

School History

Bill entered kindergarten when five years of age. He failed three times, once in the first grade, once in the second grade and again in the fifth grade. A high frequency of reversals was evident from the very beginning of the child’s formal work in reading. His teachers reported that he was happy,

careless, and did not try to do his school work. They claimed that certain forms of social pressure had been brought to bear upon the school by the mother so that promotion had been assured, when in their judgment the boy should have been compelled to recognize his academic failure.

Clinical Data

1. Stanford Binet. The chronological age at the time of testing was 13 years 11 months. Mental age was found to be 13 years and 6 months. The intelligence quotient determined from these data was 96 and the basal age was 10 years. At the 12-year level all items were scored positive except item 4, which consisted of dissected sentences. At the 14-year level all items were scored positive except the vocabulary test and item 6 involving ability to visualize the interchanging of clock hands. At the 16-year level all items were scored negative except the interpretation of fables. The examiner reported excellent cooperation.

2. Performance Tests. On these tests Bill had a median mental age of exactly 14 years and a median percentile of 60. In the administration of the performance tests it was noted that the boy used his left hand predominantly. On the Mare and Foal, his mental age was 14 years; on the Seguin Form Board, 14 years; on the Five-Figure Form Board, 16 years; and on the Two-Figure Form Board, 14 years. His mental age as determined by the Ship Test was 15 years; Picture Completion, 15 years and 4 months; and on the Knox Cube Test, on which he made his highest score, indicated a mental age of 18. On the Porteus Maze, his mental age was 13 years and 6 months. Here he exhibited an impulsive attitude and showed little tendency to look ahead and plan the outcome of his procedure. On the Diagonal Test, his mental age was 15 years and on the Healy Puzzle, Bill made his lowest score, that of a boy with a mental age of 7 years. On this test he became very much confused when asked to work with both hands. It was evident from a study of these results that he scored slightly better on the performance tests than he did on the Stanford Binet and that both measures indicated normal mental development. Throughout the test series a tendency to give up readily was noted.

3. Anthropometric Measures. These measurements, shown in Chart I, indicated that Bill's standing height and sitting height were scored at the 78th percentile and his weight at the 100th percentile. His right grip and left grip were scored at the 40th and 50th percentiles, respectively, and his lung capacity at the 80th percentile. These physical measurements indicate that Bill is a boy of superior physical development but one who is not apt to put forth his best effort in matters which involve the expression of volition.

4. Analysis of Reading Ability. On the Gray's Oral Reading Test, Bill read as well as a boy eight months in the first grade. On the Iota Test he performed as well as a boy four months in the third grade, and on the Word Discrimination Test as well as a boy eight months in the third grade. On the average, the child's reading grade was that of a boy just entering the third grade. His expectancy grade was 8.7. His reading index was 3.0 divided by 8.7 or .34. In other words, Bill was reading approximately a third as well as he should read. Analysis of the errors made on the Gray's Oral Reading, the Iota and Word Discrimination Tests is shown in Chart II and indicates a marked tendency toward reversals. Significant errors were also made with vowels and substitution of words. Here it was evident that the boy showed a marked tendency to call "no" "on", "saw" "was", "d" "b", "p" "q", and "m" "w".

5. Report of Medical Examination. At the time of the physical examination Bill's weight was reported to be 156 pounds; vision of the right eye 20/30, left 20/20; hearing in right ear 10/10, left ear 10/10. The child was left handed and right eyed. There were evidences of defective far and near point
fusion. Secondary sex characteristics were not present. There was an infantile penis and much overweight with fat distribution more about hips and thighs than other parts of the body. The general impression was that of dyspituitarism. X-rays were made of the wrists, hands, and head. The report showed that the metacarpals and phalanges were normal and that there was no abnormality in the epiphysis. The X-ray of the head showed the sella turcica to be slightly smaller than normal. The posterior clinoid processes came well forward so as to make the sella of the closed type. No evidences of pressure or erosion from growth of the pituitary were noted. The physician in charge of the case reported his general impression as follows:

"It would seem that these cases showing the Froelich syndrome are cases of pluriglandular insufficiency. They usually show a lowered basal metabolism. (In this case—14). The failure of the pituitary results in insufficient stimulation of the gonads, so that one fails to get the characteristic sex changes. It seems quite clear from more recent study that the failure of the gonad is directly related to deficiency of the anterior lobe of the pituitary."

**Diagnosis**

The integration of the reaction patterns and abilities in the individual's behavior indicated an immature boy of normal intelligence showing certain manifestations of the Froelich syndrome and a low metabolic rate. A mental set against reading was evident which may have been due to formal training in reading before a sufficient degree of maturity had been reached. The profile of errors showed a high frequency of reversals and substitutions.
PROFILE OF ERRORS

Chart II.

Z-Scores

<table>
<thead>
<tr>
<th>V</th>
<th>C</th>
<th>R</th>
<th>A</th>
<th>O</th>
<th>S</th>
<th>Rp</th>
<th>Aw</th>
<th>Ow</th>
<th>Ra</th>
<th>TOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>+5</td>
<td>+4</td>
<td>+3</td>
<td>+2</td>
<td>+1</td>
<td>0</td>
<td>-1</td>
<td>-2</td>
<td>-3</td>
<td>-4</td>
<td>-5</td>
</tr>
<tr>
<td>Excessive Errors</td>
<td>Inferior Reading</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Superior Reading

Legend

V—Vowel errors
C—Consonant errors
R—Reversals
A—Addition of sounds
O—Omission of sounds
S—Substitution
Rp—Repetition
Aw—Addition of words
Ow—Omission of words
Ra—Refusals and words aided
TOT—Total errors

The reversals may have been caused by the confusion frequently associated with strephosymbolia and immaturity. The substitutions may have resulted from an inadequate method of word analysis and over-emphasis of contextual clues. The case history indicated an unwillingness to put forth effort which is frequently associated with the Froelich syndrome. Certain eye defects resulted in difficulties of fusion.

Remedial Treatment

Remedial treatment consisted of the following procedure: The use of whole gland pituitary extract and some thyroid as suggested by the physician in charge of the case. The sounding-tracing methods suggested by Monroe were employed and an attempt was made to develop a method of word analysis. Frequent refractions were made by the ophthalmologist to overcome the difficulties of faulty near and far point fusion; and an attempt was made to make Bill feel that he was a boy of normal intelligence and that he could do successful school work. Details of remedial treatment are shown in Table I.

Results of Remedial Treatment

Approximately fourteen months after initiating remedial measures, Bill was reported to have lost twenty-one pounds in weight. His reading level determined by the Stanford Achievement Reading Test, and expressed in terms of a grade score, was that of an individual five months in the seventh grade. This was a significant gain of four years and five months. Little or no change in sex development was reported, although Bill was alleged to have become aggressive, nervous, and at times impatient and ill tempered. Subsequent reports received nearly a year later indicated that Bill was reading as well as a boy eight months in the eighth grade and that he was making a satisfactory academic adjustment.
### TABLE I

#### SUMMARY OF DIAGNOSIS

<table>
<thead>
<tr>
<th>Disability</th>
<th>Basis of Observation</th>
<th>Remedial Suggestions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immature, easy going. Unwilling to work up to capacity. Sluggish, childish.</td>
<td>Actual observation, report of parents, teachers, and physicians.</td>
<td>Administer whole gland pituitary and thyroid extract under direction and control of physician.</td>
</tr>
<tr>
<td>Marked tendency to make reversals.</td>
<td>See profile of errors.</td>
<td>Use tracing - sounding procedure suggested by Monroe. Ask Bill to trace from left to right while articulating the sound in correct sequence.</td>
</tr>
<tr>
<td>Marked tendency to make substitutions.</td>
<td>See profile of errors.</td>
<td>Develop method of word analysis. Find words within words. Use materials with simple vocabulary.</td>
</tr>
<tr>
<td>Loses place in reading. 15-18 fixations per line.</td>
<td>Actual observation and report of teachers. Actual count.</td>
<td>Repeated refractions to compensate for errors of fusion was suggested by ophthalmologist.</td>
</tr>
</tbody>
</table>

#### Summary and Conclusions

The writer has briefly summarized several factors related to maturation and the ability to read. A clinical problem of reading disability has been presented which has illustrated several characteristics of immaturity chiefly associated with the Froelich syndrome. Initial findings and results have been stated as observations and no inferences concerning the case have been set forth. Several more striking cases of a similar nature have been reported by Mateer. A recent review of her work by Hoskins\(^\text{2}\) gives the viewpoint of many physicians and psychologists concerning the treatment of endocrine dysfunction in children showing mental and academic retardation or behavior difficulties. Hoskins, in discussing similar findings by Mateer says, "That the hormones influence behavior, emotional experiences, and mental development only the willfully uninformed can doubt. The problems of practical psychology are difficult. Those of endocrinology are scarcely less so. When the intangibilities of psychology are added to the uncertainties of endocrinology, something less than certitude is inevitable."

Collateral Reading (Endocrine Dysfunction)


The Educational Approach to Speech Correction

C. VAN RIPER, Ph. D.

Director of Speech Clinic

In contradistinction to the problem presented by reading disability which is ordinarily met with and dealt with in the public schools and less commonly in the clinic, the problem of the speech defective is usually discussed from the clinical rather than the educational point of view. Such emphasis on the clinical aspect of speech correction will seem entirely natural if we consider the men whose research has given it its impetus or the relatively recent development of its methods. Moreover, the public schools have been forced to face the reading disability problem because theirs was the responsibility for teaching reading. Unfortunately for the million or more school children in this country who are afflicted with speech handicaps, the public schools have felt no such responsibility with regard to speech disabilities. Teachers reason that since children are not taught to speak by the schools, speech disabilities are none of their concern. As a consequence, the educational profession has contributed very little to our knowledge of the causation or cure of speech disorders, and the psychological and psychiatric clinics have been so beleaguered by adult speech defectives that they were forced to develop techniques to help them. This condition, instead of attracting the immediate attention of educators to the need for prevention and treatment in the early grades, merely contributed to the widespread belief that a speech defect was a clinical problem and not an educational one. Young clinicians in a young field of therapeutics encouraged, even as did the early healers in medicine, such an attitude, and added as much profundity and impressiveness as they could muster to the mysterious "science of speech pathology." It was fortunate indeed that certain schoolmen and women perceived both the need for and the simplicity of most speech correction techniques and reasoned that a large share of speech disabilities could be remedied in the early grades if trained teachers could be procured. The universities and teachers colleges were gradually prevailed upon to offer courses in speech correction, and at the present time many of the progressive elementary and secondary schools employ special speech correction teachers and provide opportunity for remedial speech work. Many more are seeking elementary teachers who have had some training in speech correction. These facts indicate that the school is accepting its responsibility for the development (and remedial treatment where necessary) of that most vital of all our social functions—speech.

Extent of need for speech correction in public schools

Various surveys\(^1\) have given us varying figures as to the number of speech defectives in our school populations. The variance is of course due to the difference in standards and criteria used by those conducting the survey. As phoneticians have come to realize\(^2\), the normal range of speech deviations is rather wide, and a speech difference which constitutes a defect in one locale or social stratum would be quite acceptable in some other situation. It is for this reason that modern speech correction has defined a speech defect as that deviation from the normal speech pattern of the group which calls attention to itself, interferes with communication and constitutes a maladjustment to the individual’s environment.\(^3\)

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\(^4\) Travis, L. E., Speech Pathology, Appleton, N. Y., 1931; p. 35.
Defined in this sensible way, the incidence of speech defect in the schools of this country is found, by all surveys, to be large enough to command attention. According to the White House Conference on Child Health and Protection of 1930⁶, "There are in America at least 1,000,000 school children between the ages of five and eighteen so defective in speech as to require remedial treatment and training. This number does not include those who stopped their schooling before reaching eighteen years."

Since this figure is so conservative as to be the lowest estimate reported in the literature, the need for speech correction as an educational rather than a clinical service is clearly manifest. At the same time the report points out that the speech defectives outnumber by a wide margin all the deaf, blind, crippled and feeble-minded children combined, and suggests that if the state and the educational systems accept the responsibility for the latter they should do so for the former, especially in view of the economy of speech correction when compared with the special education of the other handicaps. Comparative annual additional costs of special education per pupil for the various types of handicapped children are as follows:⁷

<table>
<thead>
<tr>
<th>Type of Handicap</th>
<th>Annual Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blind children</td>
<td>$500</td>
</tr>
<tr>
<td>Deaf children</td>
<td>264</td>
</tr>
<tr>
<td>Crippled children</td>
<td>500</td>
</tr>
<tr>
<td>Mentally retarded children</td>
<td>300</td>
</tr>
<tr>
<td>SPEECH DEFECTIVE CHILDREN</td>
<td>10</td>
</tr>
</tbody>
</table>

While no one would wish to lessen the amount of special education given to the other handicapped children, it seems only just to point out that the speech defective who is freed from his handicap by special education will be likely to make a much greater return to society than will the mentally defective or the blind or the deaf. If financial resources dictate a policy of the greatest good to the greatest number, the speech defective should find consideration. The indisputable fact that he has heretofore found very little is due to the speech defective’s inability to communicate his needs, and to the less obvious and dramatic nature of his symptoms. Johnson⁷ points out that society should not disregard speech handicaps because they present no striking abnormalities, since the personality problems built up about the speech disorder may come to far outweigh the original communicative handicap.

Many educators feel that the clinic rather than the schools should handle the speech defectives because the majority of speech disorders are too serious for teachers to handle. That this opinion is not well founded is seen from a consideration of statistics⁸ based upon a careful survey of a typical American city. In every ten thousand cases the number of speech defectives according to type of speech disorder was as follows:

<table>
<thead>
<tr>
<th>Type of Disorder</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral inaccuracy</td>
<td>4,851</td>
</tr>
<tr>
<td>Articulatory (structural)</td>
<td>1,059</td>
</tr>
<tr>
<td>Stuttering</td>
<td>1,029</td>
</tr>
<tr>
<td>Sound substitution</td>
<td>1,014</td>
</tr>
<tr>
<td>Voice disorders (functional)</td>
<td>1,014</td>
</tr>
<tr>
<td>Foreign and dialectal</td>
<td>470</td>
</tr>
<tr>
<td>Vocal (structural)</td>
<td>441</td>
</tr>
<tr>
<td>Articulatory (paralytic)</td>
<td>59</td>
</tr>
<tr>
<td>Aphasia</td>
<td>29</td>
</tr>
<tr>
<td>Hard of hearing speech</td>
<td>15</td>
</tr>
<tr>
<td>Vocal (paralytic)</td>
<td>15</td>
</tr>
</tbody>
</table>

⁷White House Conference Report, opus cit.
⁹West, R., Kennedy, L. and Carr, A., The Rehabilitation of Speech, Harpers, 1937. XIX.
Of this number, over 70% (the articulatory, sound substitution, oral inaccuracy, and foreign speech) are of such nature that they can be handled by almost any good teacher who has some acquaintance with the methods of speech correction. Moreover, a large share of the remaining 30% will respond to intelligent teaching. At the present time the stutterers and functional voice cases are far too frequently the victims of well meaning but sadly ignorant teachers. What the teaching profession needs is information and training. Progressive teachers’ colleges are recognizing this need and we may hope that the time will come when all elementary and speech teachers will have had enough preparation to enable them to help the forgotten speech cripples. We may hope too that the time will come when school administrators will insist upon speech surveys or routine speech examinations in their schools so that they may be made aware of the number of children so handicapped. Finally, we may hope that special supervisors in speech correction will be placed in the larger systems to take care of the more difficult cases, to give counsel and supervision to the teachers, and to ensure the adequate dissemination of information tending to the prevention of speech defect. All of these hopes are finding some fulfillment today in progressive school systems and the trend toward adequate educational care of the speech defective is showing remarkable growth.

Prevention of Speech Disabilities

As the results of the great educational campaign against tuberculosis have shown, the most important agency of prevention is information concerning the causes, nature and development of the disease or disorder. The woeful ignorance of most parents and teachers with regard to the causes, nature and development of their children’s speech disorders is certainly a very large part of the reason so many of them arise and continue to develop. To disseminate some of this information should be the duty of any one possessed of the proper background, and hence we provide this brief survey of the nature, causes and development of the various speech disorders.

Speech disorders fall into four large groups: disorders of rhythm, disorders of articulation, disorders of phonation, and disorders of symbolic formulation and expression. Under disorders of rhythm we include stuttering (stammering) the disorder characterized by blockings or spasms, by repetitions and prolongations of words, syllables or mouth postures, all of which (together with the contortions and devices used to postpone, disguise, start or release their speech abnormality) produce interruptions and breaks in the rhythm of speech; and cluttering, the disorder produced by too rapid a rate of speech characterized by slurred and omitted syllables and consonants, improper phrasing, and distorted speech sounds.

Under disorders of articulation we include all those disorders characterized by the substitution, omission and distortion of the speech sounds. There are many somewhat synonymous and overlapping terms in common use for these disorders, among which we can name baby-talk, a disorder with no organic basis but characterized by stereotyped substitutions similar to those used by the normal child in the early stages of speech development; lal ting, characterized by defective r, l, g, k, t, d, or n sounds, and largely due to inactivity or sluggishness of the tongue; lis ping, a disorder of the sibilant sounds and characterized by the substitution for the s-sound of th (lingual lisp) sh or a similarly distorted s or z (lateral lisp), t (occluded lisp) or the nasal snort resulting from the attempt at making an s through the nose (nasal lisp); oral inaccuracy and sound substitution due to improper training or faulty speech structures.

Under disorders of phonation we have three major divisions, disorders of pitch, of intensity, and of timbre or voice quality. Typical pitch disorders are the monotone, the shrill voice, the basso profundo, and the disorder characterized by stereotyped inflections. Typical disorders of intensity are aphonia, the lack of any voice, often characterized by breathy whispering; too loud or strident a voice; too weak a voice; and the voice disorder consisting of irregular or stereotyped intensity changes. Under disorders of voice
quality we find two very frequent types, hyper-nasality (including cleft palate) and hypo-nasality, and a multitude of other types which have been described in the literature by as many names as there are appropriate adjectives. Among these we will mention the pectoral, guttural, orotund, the harsh, the husky, and the hoarse voices.

Under the disorders of symbolic formulation and expression we have that disorder of the linguistic aspect of speech known as aphasia. This is characterized by the inability to comprehend, or formulate or express certain ideas through speech. It is usually due to injury to or disease of the central nervous system, and is seldom found in most school systems.

The above sketch of the various speech disorders is not complete and certain disorders such as foreign speech will fall under more than one heading, but the schema is adequate for the identification of all the cases usually met with in educational institutions. The common causes of the disorders are as follows: According to recent research in speech pathology there is no single cause responsible for stuttering. Instead there seems to be present in the large majority of instances two sets of causal factors. These have been called predisposing and precipitating causes. Under the former are included: stuttering in the family history, birth injuries, high fevers during onset and development of speech, retardation in motor coordinations, thyroid medication, shift of handedness, and prolonged emotional strain. The instability thus produced is thought to be ineffective until some event or influence precipitates the disorder, and the child begins to show the primary symptoms of stuttering (repetitions and prolongations). Among the precipitating factors are: physical or emotional shocks, cumulative pressure or insecurity, use of the non-preferred hand for writing or other fine skills, speech conflicts (such as fear of interruption, confession of guilt, speech competition, speech exhibition, etc.), and prolonged illness or anaemia.

Teachers and parents should know that there are two stages in the development of stuttering since if a child can be kept in the primary stage of the disorder, his chances of outgrowing it (without clinical help) are approximately 80 out of 100, whereas if he develops the fears, and habitual tricks of avoidance, postponement, disguise and release which characterize the secondary stage of the disorder, his chances are only about 15 out of the 100. The causes of cluttering are: hyperthyroidism, speech conflicts in the home, lack of proper speech standards, low mentality plus parental or scholastic pressure.

The causes of the articulatory disorders are of two types: functional and organic. Among the latter are striking deviations in the size, length or shape of the palate or the tongue; the presence of dental irregularities or of an overshot or undershot jaw; the presence of scar tissue, paralysis or pathological tissue; chorea, myxedema, and lesions in the central nervous system. Hearing deficiencies produce errors of omission, substitution or distortion of speech sounds, and so also does blindness, especially in the early grades. Among the functional causes are: mental deficiency, emotional maladjustment, parental baby-talk, improper stimulation during the early years (this includes both too much and too little stimulation along with too complicated speech material and stimulation at the wrong times. It is curious how careful we are in teaching children to read and how careless in teaching them to talk), imitation, poor sound discrimination, short auditory memory span, and the lack of proper speech standards in the home.

Parents and teachers must realize that speech patterns are habits and that any systematic errors must be eliminated as soon as possible. They should be aware of the great difficulty experienced by an adult in getting rid of a lisp or a sound substitution. They should not delegate the responsibility to nature or to each other. They should not content themselves with an occasional correction or expression of irritation. They must seek out the

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sources of proper information and apply the proper techniques in a systematic and intelligent manner. One caution, however, is necessary. Parents and teachers should know the manner in which speech sounds develop. They should realize that certain sounds are not acquired by the child until relatively late, that there is a certain sequence to the development of speech sound acquisition. Hence, it is inadvisable to work with a pre-school child's lisp. Nature intended the child to develop the s, r, and l sounds much later than the pre-school years.

Parents and teachers should not only be able to recognize the appearance of the functional causal factors when they begin to influence the speech of the child, but they should also be alert to the opportunity presented by modern orthodontia and surgery in remediying organic conditions which in the past have defied all medical efforts. The remodelling of teeth, palate and jaw is now so well developed in its methodology that very few children should have articulatory defects due to malformations of such structures. But the work must be done when the child is young. If parents and teachers could but realize how effective speech correction is when the child is young, and how laborious a few years later, they would never ignore the child's speech needs nor postpone the appropriate treatment. Speech defects should be prevented, not cured.

As in the articulatory disorders, the causes of the voice disorders (phonation) are both functional and organic. The more common are: association with other people with similar voices; improper breathing patterns; the use of an improper and unnatural pitch level; emotional conflicts and strain; over-use and strain of the voice; change of voice due to puberty; defective hearing; poor pitch discrimination. Among the common organic causes of voice disorders are: cleft or sluggish palate; nodules and growths on the vocal folds themselves; catarrhal and other diseases of the nose and throat; lack of sexual development; adenoidal growths and so on. The majority of voice disorders are due either to strain or to emotional problems.

Parents and teachers should be trained to recognize the early symptoms of voice disorders. They should take their cleft palate children to the oral surgeon as soon as possible. They should realize how much damage may be done by subjecting the child's voice to over-strain. They should realize the influence of imitation, and strive to serve as good rather than poor models for their children. They should know enough mental hygiene to enable them to lay a basis for the intelligent solving of emotional conflicts. So much can be done by intelligent teachers in the way of prevention of all these disorders that sooner or later the educational profession must adopt speech correction as a formal part of teacher training. Parent-teacher groups find the study of speech development tremendously interesting and helpful. Parent-teacher cooperation is tremendously stimulated through a joint assumption of responsibility for a child's speech improvement. The place for speech correction is not in the college or university clinic but in the public schools. The clinic serves a worthwhile purpose in diagnosis, recommendation and service offered to the difficult cases, and it is invaluable in teacher-training and the dissemination of information, but it can never hope to meet the problem presented by the forgotten children. That problem will only be solved by the training of teachers in speech correction and by their education of parents in the methods of prevention and early recognition of speech defects.