A SURVEY OF SPEECH THERAPIES FOR THE CEREBRAL PALSIED

Thesis for the Degree of M. A.

MICHIGAN STATE COLLEGE

Robert Lee Cheinlere

1950

This is to certify that the

thesis entitled

A SURVEY OF SPEECH THERAPIES

FOR THE CEREBRAL PALSIED

presented by

Robert Choiniere

has been accepted towards fulfillment
of the requirements for

M. A. degree in SPEECH

Major professor

Date Aug. 11, 1950

A SURVEY OF SPEECH THERAPIES FOR THE CEREBRAL PALSIED

BY

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A THESIS

Submitted to the School of Graduate Studies of Michigan State College of Agriculture and Applied Science in partial fulfillment of the requirements for the degree of

MASTER OF ARTS

Department of Speech

1950

ACKNOWLEDGMENTS

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The author wishes to express his grateful appreciation to Dr. Charles Pedrey, Director, Michigan State College Speech Clinic, for his invaluable guidance in the writing of this thesis. Acknowledgments are also due to Dr. A. T. Cordray, Counselor of Foreign Students, Michigan State College, for his expert assistance in editing the thesis.

Most deeply and directly the author is indebted to his wife, Nedra Choiniere, for the time and effort spent, and the patience exhibited, during the writing of this thesis.

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CHAPTER I

THE PROBLEM AND THE STATEMENT OF PURPOSE

It is noted that in the early history of man the cerebral palsied, as well as countless other people with serious physical difficulties, were regarded as derelicts of society.

> Historically, the first reactions of normal persons to abnormality in others were those of rejection. Among primitive peoples the rule of survival of the fittest has always been as paramount in human relationships as it has been in nature.1

As such they received treatment which today would seem unjust, to the point of being inhumane. Many were willfully abandoned or killed outright on the premise that they possessed devils or other evil spirits. "The palsied person as well as any other handicapped person was quite likely to be regarded as a joke perpetrated by the Almighty or perhaps by Satan."[2] There followed then a period in which the afflicted were subjected to ridicule and the humble position of court jester or comedian.

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1 C. Van Riper, Speech Correction Principles and Methods (New York: Prentice-Hall, Inc., 1944), p. 2.

2 M. A. Perlstein, The Problem of Cerebral Palsy Today (New York: Association for the Aid of Crippled Children, 1947), p. 11.

> The Middle Ages found a great demand for the crippled, blind, and mentally deficient for use as court jesters and fools. Thus society reacted to misfortune in others by laughter and by the consequent heightening of its own sense of security.3

It would seem that such reactions were the result of gross ignorance of the condition and its causes rather than mere lust in satiating sadistic tendencies. It is also apparent that superstition played an important part in engendering such response. It wasn't until about 1200 A.D. that any organized work was undertaken to aid the afflicted. It was at this time that the Order of the Sisters of Charity pitied the misfortunes of these people and began to care for them.[4]

> Since that time the church, the government, and the educated classes have led in the extension of the concept that the abnormal person not only has a right to existence, but also deserves pity, protection, and assistance.5

We are fortunate in having the advantages of rapid intellectual progress evidenced in our society of today. Technical advances in all fields, scientific and otherwise, have been tremendous in the last century. With the technological advances that have occurred, there has been a trend toward specialization in the particular phases

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3 Van Riper, op. cit., pp. 2-3.

4 Ibid., p. 3.

5 Loc. cit.

of a given science or industry. This phenomenon, with respect to the diagnosis and treatment of the cerebral palsied, has been highly beneficial. Today the person afflicted with cerebral palsy can receive the services of people who are especially trained in the rehabilitation of his particular difficulty. It is now known that the cerebral palsied person needs medical attention, neurological treatment, physiotherapy, speech training, and personal guidance, to mention only the more prominent services rendered.

This paper shall concern itself primarily with the rehabilitation of cerebral palsy and the part the speech correctionist plays in it. It shall necessarily include much material of a nature not directly relevant to actual steps taken by the speech correctionist in the treatment of cerebral palsy, but which is needed in his general background in order to further his comprehensive understanding of the problem. Cerebral palsy is a condition about which not a great deal is known, even up to the present day. It has only been in recent years that much could be found in our libraries about it. The neophyte in speech correction discovers that it is a real problem to find such material to which he can refer. It is only after long hours and considerable effort that the reading of the articles and texts on the subject is accomplished. The purpose of this survey shall be to create a source

of information for the speech correctionist. It will be a compilation of the leading contemporary theories of the causes, descriptions, and treatment of persons afflicted with cerebral palsy.

CHAPTER II

DESCRIPTION OF TYPES AND DEFINITIONS OF TERMS USED

The problem of cerebral palsy presents a variety of forms of definitions which are necessary in describing the causes and treatment. "Cerebral palsy" was selected years ago as a descriptive term because it best fitted the particular group of conditions exhibited by this condition. The term "cerebral" means anything within the head. The technical term "palsy" describes anything which is wrong in the voluntary control of the muscles or joints. Infantile paralysis, for example, is a palsy, but not a cerebral palsy since the conditions arise in the spine. This would classify infantile paralysis as a spinal palsy or paralysis. A peripheral palsy is one in which the damage or injury is to the peripheral nerves in the extremities of the arms or legs. Thus, as the terminology indicates, it can be said that cerebral palsy is any disorder of the control of the muscles or joints arising from a condition within the head. The damage or deterioration of tissue is known as a lesion.

Cerebral palsy is divided into five subdivisions, each of which is a distinct and separate entity. The names of these types are merely descriptive of the particular disturbance. The first of these types, though not

necessarily the most frequent or most important, is the spastic. The spastic child is one whose difficulty is characterized by a hypertension or "over-tenseness" of the muscles. A muscle itself can only contract. Two muscles, or groups of muscles, which work in opposition to each other are antagonists. As it has been pointed out in physiology, when a muscle contracts, there is another muscle which extends. These are known as the flexor and extensor muscles. It is the contraction of the antagonist which causes its opponent to extend. As an example, if one were to extend his arm in front of him and then raise it at the elbow, the biceps muscle would contract while the triceps muscle would extend, since they are antagonists. To lower the arm to its initial position, the reverse would occur. The triceps muscle would contract while the biceps extended. It is in this function that the spastic has his disturbance. The flexor attempts to contract, but the extensor also contracts, thus restricting the action of the flexor. This opposition, or lack of coordination gives the movement its "spastic" or jerky trait. The muscles appear to be stiff and lack movement. This is known as the stretch reflex, i.e., the tendency of a muscle to contract whenever it is put under tension. Fothergill and Harrington discuss the phenomenon of the stretch re-

flex and its involvements in greater detail.[1] It is a reflex action that prevents extension of the muscle.

> The function of the muscle itself may not be interfered with, but the antagonist does not function properly. Dr. Phelps says that the stretch reflex is the only true basis for diagnosing the spastic.[2]

Quite often the initiation of movement of a spastic may set up a series of stretch reflexes which will resemble involuntary motion. Since involuntary motion is one of the primary characteristics of another type of cerebral palsy, as will be shown later, this is often confusing to the less experienced in their diagnosis of the particular case.

The second type of cerebral palsy is the athetoid. It is the athetoid who manifests continuous, purposeless, involuntary motion. The athetoid's muscles are normal in structure as opposed to those of the spastic; the spastic will often exhibit muscles which are flaccid or weak, whereas these conditions are not evident in athetosis. There is often difficulty in the articulation of speech sounds and in swallowing. On occasion there may even be a reversed swallowing pattern. Sometimes the whole

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1 Patti Fothergill and Robert Harrington, "The Clinical Significance of the Stretch Reflex in Speech Reeducation for the Spastic," The Journal of Speech Disorders, XIV (December, 1949) 353-55.

2 Juliette M. Gratke, Help Them Help Themselves (Dallas: Banks Upshaw and Company, 1947), p. 32.

arm will move in a sort of weaving pattern, but without any voluntary design. The individual is unable to stop these athetoid movements. Occasionally he will attempt to resist them by tensing the antagonistic muscles. As a result of this the tension becomes habitual and the term "tension athetoid" is used to describe the patient. Conversely, the "non-tension" type makes little or no voluntary effort to block the constant involuntary movements. In diagnosing the athetoid there is the possibility that he will exhibit what is thought to be spastic tendencies. In reality, the tenseness, which is a characteristic of the spastic, is the result of the individual's attempt to voluntarily control his involuntary movements.

A third type of cerebral palsy is <u>ataxia</u>, which is a condition in which there is a disturbance of balance and directional control. The ataxic patient does not exhibit a paralysis as do the spastics, nor is there any involuntary motion as in athetosis. The ataxic will stagger as he walks and will fail to exhibit a good conception of direction and space. He is also prone to falling more often than is normal. Because of the loss of directional control he is frequently unable to pick up objects. In response to questions about the ataxic condition Dr. Phelps explained that . . . .

. . . . the different types of cerebral palsy are

> correlated with differences in the location of the brain injury; the part of the brain involved in ataxia governs the ability to balance onesself and to make movements exactly as one needs or wishes. Whether the child is climbing stairs, trying to ride a bicycle, or learning to walk or typewrite, he cannot readily tell just where his legs, arms, or fingers are, nor how much power he needs to get them where he wants them.3

However, the ataxic appears perfectly quiet and normal when he is not attempting to direct purposeful motion. That is, his difficulty exhibits itself only when he attempts to make a directed movement. Many medical men believe that with this type of difficulty there may be involvements of sensation, vision, or speech.

The fourth classification of cerebral palsy is the rigidity. The rigidity is, in many ways, similar to the spastic. The muscles are stiff and rigid, but they are not tense and hyperactive like the spastic muscles. In rigidity the stretch reflex is not present. In order to test, it is possible to push a spastic off balance and this will elicit a sudden reaction of all the muscles as a compensation against falling. In the same test, the patient suffering from rigidity will not attempt any protective muscle contraction, but will merely fall over. The muscles of the rigidity patient are normal, but they

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3 Harry V. Bice and Margaret G. Davitt Holden, "Group Counseling with Mothers of Children with Cerebral Palsy," Journal of Social Casework, (March, 1949).

do not work well, thus bringing about the loss of quick reaction to a loss of balance.

The fifth type of cerebral palsy is the tremor which is seen most frequently in old people. There are varying types of tremor but all are forms of cerebral palsy.

It has been thought for a considerable period of time that patients of cerebral palsy could exhibit a combination of its various types but this is refuted by Dr. Winthrop M. Phelps.

> There are not often found combinations of these diagnostic types in one patient. Years ago a good many diagnoses of mixed types were made, but on checking through the records it is found that fewer and fewer diagnoses of mixed types are made. Probably where such a diagnosis was made in the past, it was due to inaccuracy. However, there are definitely some mixed types found from time to time. The most common mixed type is the rigidity-tremor combination which is seen in patients who have had brain infections like encephalitis which is an acquired type of cerebral palsy.[4]

Dr. Meyer Perlstein is in agreement with this for he states that . . . . "although a given patient may exhibit all of these qualitatively different motor defects simultaneously, he generally suffers, wholly or predominantly, from only one of them."[5] In their discussion of types of cerebral palsy West, Kennedy, and Carr state that . . . . "an individual

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4 Winthrop M. Phelps, "Let's Define Cerebral Palsy," The Crippled Child, June, 1948.

5 M. A. Perlstein, The Problem of Cerebral Palsy Today (New York: Association for the Aid of Crippled Children, 1947), p. 7.

who presents only one of these indications of cerebral palsy is rarely found; on the contrary, there is usually present a mixture of the three, with one or another of the symptoms predominating."[6] It would seem that this statement is in opposition to the theories put forth by Perlstein and Phelps. The essential difference is in the use of the term "predominating" by West, Kennedy and Carr. They assert that although a child may be a spastic, he usually has other involvements, but it is the spasticity which predominates. The involvements, however, may be very slight but are definitely present.

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6 Robert West, Lou Kennedy, and Anna Carr, The Rehabilitation of Speech (revised edition; New York: Harper & Brothers, Publishers, 1947), p. 426.

CHAPTER III

THE ETIOLOGY OF CEREBRAL PALSY

In looking over the great amount of material written about the nervous system, its structure and functions, it is obviously too far-reaching and involved for a complete treatment of it in this survey. On the assumption that certain fundamental concepts of neurology are understood, it should be necessary only to review them briefly. The nervous system is composed of tremendous numbers of white bundles of fibers and gray cell-bodies. These are called neurones and they perform one of three functions.

1. Some transmit the stimulus into a central nervous system from the outside, or from the viscera, or from the muscles, tendons, and joints. These are known as the afferent or sensory neurones. "Under normal conditions the afferent fibers are stimulated only at their endings in the peripheral tissues, in the skin, the mucous membranes, the sense organs, etc."[1]

2. Others go neither in nor out, but their function is to integrate the incoming impulse in preparation for a response. They form the junction or connection

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1 William H. Howell, A Text-book of Physiology for Medical Students and Physicians (Philadelphia: W. B. Saunders Company, 1933), p. 93.

between the afferent and efferent fibers, and thus they are designated as intermediate neurones.

3. Still others transmit impulses which produce activity in the muscles and glands. These are known as the efferent, or motor, neurones.

> The older physiologists believed that one and the same nerve or nerve fiber might conduct sensory impulses toward the central nervous system or motor impulses from the central nervous system to the periphery. Bell and Magendie succeeded in establishing the great truth that a nerve fiber cannot be both motor and sensory. Under normal conditions the efferent fibers are stimulated only at their central origin, -- that is, through the nerve cells from which they spring. The difference in the direction of conduction depends, therefore, on the anatomical fact that the efferent fibers have a stimulating mechanism at their central ends only, while the afferent fibers are adapted only for stimulation at their peripheral ends.2

The neurones are organized into systems of distinct function. These are the central nervous system which includes the brain and spinal cord, and the autonomic nervous system which includes the sympathetic and parasympathetic divisions. The sympathetic and parasympathetic divisions of the autonomic nervous system function antagonistically. The primary purpose of the sympathetic division is to activate the body for struggle and to increase its defensive powers. The parasympathetic division functions to conserve the life-sustaining body functions. There is a close relationship between these two divisions and the

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2 Ibid., p. 93.

central nervous system.

Twelve pairs of nerves emerge from the brain and thirty-one pairs from the spinal cord. These constitute the trunk lines which carry impulses to and from the central nervous system.

> The two major subdivisions are: (1) the cerebrum and (2) the brain stem which includes (from above downward) a the striate bodies at the base of the cerebrum, b the thalamus, c the mid-brain, d the cerebellum-pons, and e the medulla, from the lower end of which entends the spinal cord. The cord acts primarily as a conductor. From the cells in the H-shaped column in the center of the cord, axones go out to muscles (motor or efferent fibers); other axones are sensory (afferent), carrying impulses to sub-cerebral centers or to the cerebrum itself; still others are correlating neurones acting to synthesize nervous activity.3

There is in this system a definite hierarchy of control with each unit in the group capable of independent action, yet subservient to those groups above it. There has been an evolutionary pattern in the development of these various sections.

> You will note that the spinal cord constitutes the lowest hierarchy. Above the cord is the medulla, a truncated cone enlargement of the cord, and, posteriorly, the cerebellum. Next in order is the pons, and above the pons the mid-brain. Much later in neurological development was superimposed the thalamus, and it represented for some time the highest gradient of activity. Then a superior coordinating system developed

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3 Mildred Freburg Berry and Jon Eisenson, The Defective in Speech (New York: F. S. Crofts & Company, 1945), p. 28.

> in a group of nuclei contiguous to the thalamus; they are known as the striate bodies. They still form today an ancestral motor-coordinating system. Finally the cerebral cortex was developed to be superimposed over all lower centers.4

The only directly related function of the spinal cord in the control of speech is in breathing. The higher centers direct impulses which go out from the lower motor neurones to innervate the muscles engaged in breathing in the abdominal and thoracic regions.

"The medulla is a continuation within the skull of the spinal cord. It is about an inch in length, and larger in circumference than the cord."[5] It is functionally more complex than the spinal cord and is probably the lowest level for any integration involving speech.

> In the dorsal part of the medulla is the respiratory center, fibers from which make connection with the lower motor neurones of the spinal nerves. The center controlling circulation (vasomotor center) also resides in the medulla. This level is also important because of the great number of cranial nerves (VIII-XII, nerves to ear, mouth, pharynx, larynx, and respiratory mechanism) which issue from it . . . . all the major conduction paths which maintain efficient relations between receptors and effectors of the body are to be found at this level. These great pathways to higher centers and from lower centers cross to opposite sides in passing through the medulla so that above the medulla the right side of the brain controls the left side of the body.[6]

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4 Ibid., p. 30.

5 Giles W. Gray and Claude M. Wise, The Bases of Speech (revised edition; New York: Harper & Brothers, Publishers, 1946), p. 310.

6 Berry and Eisenson, op. cit., p. 31.

"The cerebellum is a fissured structure attached to the brain stem by three pairs of peduncles."[7] It is just posterior to the medulla and directly under the projecting posterior wings of the cerebrum.

> This center is a 'clearing house' for all impulses sent to the striped muscles of the body. Were it not for this center, a given set of muscles could engage in only one activity at a time; we would not be able to stand, breathe, nod, turn the head, and speak simultaneously, for these acts require the coordination of largely overlapping sets of muscles, and, in some instances, require opposing movements.8

The cerebellum, in expediting the efficient accomplishment of its functions, maintains a constant state of stretch in the striped muscles. This tautness is known as muscular tonus. "The primary purposes of the cerebellum are two: to provide the requisite tonus to muscles, and to tune up the motor apparatus so that the muscles respond promptly and accurately."[9] The cerebellum also maintains the body in a state of balance with respect to gravitational pull.

The pons is that portion of the brain which joins, or bridges between, the cerebral cortex and the cerebellum.

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7 Ernest Gardner, Fundementals of Neurology (Philadelphia: W. B. Saunders Company, 1947), p. 145.

8 Robert West, Lou Kennedy, and Anna Carr, The Rehabilitation of Speech (revised edition; New York: Harper & Brothers, Publishers, 1947), p. 35.

9 Berry and Eisenson, op. cit., p. 31.

> In addition, there are found here two centers important for speech: (1) the nucleus of the motor section of the fifth cranial nerve, which innervates the muscles of the lower jaw; and (2) the seventh nerve nucleus, which sends fibers to the remaining facial muscles.10

It is through the midbrain that the great ascending and descending pathways run, but its direct control over speech is doubtful.

The striate bodies, sometimes referred to as the basal ganglia, and the thalamus function in the control of emotions and in the finer coordinations essential for rhythmic speech. They are the last of the controlling stations prior to the cortex. Gardner expresses the belief that the thalamus does even more when he says that it . . . . "is not only concerned in synaptic relays, but is also integrated in some manner with cortical functions."[11]

The cerebrum, largest organ in the cranium, is deeply creased by fissures. It is divided into two hemispheres by the great longitudinal fissure. The right hemisphere generally controls the functions of the left half of the body, and the left hemisphere generally controls the functions of the right half of the body. In the con-

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10 Ibid., p. 33.

11 Gardner, op. cit., p. 288.

trol of the speech organs, however, some of the most important exceptions to this rule exist.

There are four major areas, or zones, of the cerebral cortex. They are the frontal, the parietal, the temporal, and the occipital lobes.

The frontal lobe is the primary motor area which sends fibers to the skeletal musculature. There are pathways which originate in the giant pyramidal cells of the motor cortex of the cerebrum and these paths are called the pyramidal tracts. Paths which come from the basal ganglia area and control associated movement are referred to as the extrapyramidal tracts. The extrapyramidal area and Broca's area for motor speech are also located in this lobe.

"In the parietal lobe are the cell bodies of the highest order for all incoming sensory impulses . . . . a center for the understanding of speech also is ascribed to the posterior section of this lobe."[12] It is in this area that is derived the kinesthetic sensitivity of muscular movement.

The temporal lobe is very important to the normal development of speech for it is into this area that all auditory impulses come for conscious analysis. It is in

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12 Berry and Eisenson, op. cit., p. 35.

this auditory receptive center that the most frequent stimulus to speech comes. Intermediate neurones connect with cells in Broca's area and some fibers run into the pre-motor area.

In the occipital lobe are the centers for the reception of visual stimuli.

In addition to what has been discussed, there is considerable that goes into the process of speech and other motor functions. The endocrine system, the circulatory system, certain reflex patterns, and many other factors are included in the overall picture. For the explanation of what occurs in cerebral palsy, however, further discussion of the involvements of this process is not absolutely essential.

Among medical authorities there is no disagreement as to cause. Its causes are the destruction of, or damage to, brain tissue, or the congenital malformation or maldevelopment of the central nervous system. In attempting to determine the specific cause of the lesion, or brain damage, in any given case, the task of the diagnostician becomes considerably more difficult. "The large number of etiological factors acting on the infantile brain to cause cerebral palsies may be classified into those effective (1) within

the uterus, (2) during birth and (3) in early infancy."[13] This theory is also substantiated by Dr. Howard Rusk who writes, ... "most cases of cerebral palsy are caused by injury to the brain during birth, or by faulty development of brain cells."[14] He also mentions the Rh blood factor, encephalitis, and meningitis as possible causes. Dr. Meyer A. Perlstein expresses the belief that . . . . "most cerebral palsy is congenital in the sense that it occurs when the child is born or before the child is born."[15] Marsee Evans also contends that there are three general times when the inciting cause of cerebral palsy may occur: . . . . "before birth, at or near the time of birth, and after the birth of the child. These times are generally referred to as 'prenatal', 'neonatal', and 'postnatal'."[16] The assertion of such theories by the contemporary leaders in the field of cerebral palsy tends to refute the belief of earlier leaders in the fight against cerebral palsy. Evans[17] explains that it was the contention of Dr. Little

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13 Roy R. Grinker, Neurology (third edition; Toronto: Ryerson Press, 1936), p. 874.

14 Howard A. Rusk, "What Can Be Done For Cerebral Palsy," The American Mercury, November, 1948.

15 Meyer A. Perlstein, "Ask The Doctors," The Crippled Child, June, 1949.

16 Marsee Fred Evans, "Problems in Cerebral Palsy," The Journal of Speech Disorders, XII (March 1947), 88.

17 Ibid, p. 87.

and his contemporaries that the primary cause of cerebral palsy, or Little's Disease as it was then called, was injury to the brain in the period of birth. Berry and Eisenson also substantiate this by stating that . . . . "by far the largest number of cases can be traced to birth injury."[18] The difficulties at birth might be premature birth, too rapid birth, or delivery injuries. Some cases Little attributes to such things as maternal illness during pregnancy, maternal intoxication during pregnancy, faulty development in the fetus, hereditary syphilis, or intracranial hemorrhage. Parts of these theories have since been rejected. It has been shown through recent investigations based on postmortem examinations that in the newborn, intracranial hemorrhage is far more common than was previously thought. The theory of inherited syphilis as a cause has not been substantiated by either clinical or laboratory investigation. In fact, there is considerable doubt that definite hereditary or familial causes exist.

> Whether or not the condition of the mother before the child's birth has any bearing upon the situation is very debatable; and although any or all of the above named conditions may be responsible for what is known as Little's Disease, only a very small percentage of children born under them develop this difficulty.[19]

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18 Mildred Freburg Berry and Jon Eisenson, The Defective in Speech (New York: F. S. Crofts & Company, 1945) p. 305.

19 Marguerite K. Fischel, The Spastic Child, (St. Louis: The C. V. Mosby Company, 1934), p. 25.

That cerebral palsy may be hereditary is contended by Dr. Perlstein who says,

> There are some forms of cerebral palsy that are hereditary in the sense that there is a genetic carry-over. In many of the hereditary forms of cerebral palsy, the children do not survive for more than four or five years. These children thus are never seen at a cerebral palsy clinic, and our knowledge of such cases may be deficient.20

Cerebral palsy may also be the result of an accident and may come about even in youth or adulthood, although this is quite rare in occurrence. Pusitz classifies the causes of the condition into two types, congenital or acquired, and he attributes most cerebral palsy to the latter.

> The most common cause of the congenital type is due to lack of development of the pyramidal tract, leading to atrophy or sclerosis of the lateral columns of the spinal cord; to large cerebral defects; to porencephaly; to hemorrhage; or intra-uterine softening; also congenital syphilis is the cause of a small minority of cases.
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> . . . . . .
>
> The acquired cases are those occurring during labor, or those coming on later in childhood. Jones and Lovett consider intracranial hemorrhage, due to trauma of the child's head during prolonged labor, forceps delivery, or prolonged asphyxia at birth as causes. The hemorrhage is usually meningeal, but at times intracerebral, and gives rise to chronic meningeal encephalitis; sclerosis; cysts; atrophies; and porencephaly. Of those cases occurring after birth, one can list hemorrhage, embolism, endoarterial and periarterial changes, encephalitis, cerebral venus

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20 Perlstein, op. cit.

> thrombosis, and chronic meningitis as the productive factor.21

It is possible to coordinate the type of cerebral palsy which is present with the type of lesion which has occurred. If the lesion is in the motor cortex and pyramidal tracts, the resulting palsy is spasticity. "In these cases the cerebral damage is in the pyramidal tracts, that is, in the cortex or the motor pathways leading down from the cortex, which govern discrete voluntary movement."[22] This fact is further substantiated by Pusitz who says that "The lesion involves the cortex or the subcortical areas of the parietal lobes of the heterolateral hemisphere."[23]

Injury in the extrapyramidal tracts results in the purposeless, involuntary movements of athetosis.

> Although it is believed that certain lesions of the frontal lobe may cause athetoid movements, the basic pathology is found to be involvement of the basic nuclei, particularly the caudate nucleus (striate body) on one or both sides.24

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21 M. E. Pusitz, "Speech Correction in Cerebral Palsies," The Journal of Speech Disorders, IV (September, 1939), 206.

22 Evans, op. cit., p. 90.

23 Pusitz, op. cit., p. 207.

24 Loc. cit.

"The lesion is in the caudate nucleus (striate body), the so-called extrapyramidal tracts."[25]

Injury in the cerebellum results in loss of balance and ataxia. There is poor equilibrium, coordination and tonus regulations, and the condition is accompanied by a staggering walk with some exaggerated motions. "Here the lesion is in the posterior fossa above the tentorium . . . . muscle tone may be decreased, and ataxia in these cases may be due to both sensory and motor involvement."[26]

There are often certain peripheral involvements of the body accompanying the lesion. Among various writers there is some confusion as to the nomenclature of the various types of involvement, but there is a general agreement.

> When one limb is concerned the name given is monoplegia. When both arms are involved it is double hemiplegia; both legs, diplegia or paraplegia; one arm and one leg, hemiplegia; three limbs, triplegia; and four limbs, quadriplegia or tetraplegia, or sometimes diplegia.27

Other involvements are hypermotility, hemiathetosis, and bilateral athetosis.

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25 Evans, loc. cit.

26 Pusitz, loc. cit.

27 Evans, op. cit., p. 91.

Hypermotility is that quality of excessive movement of the limbs which characterizes the athetoid. Hemiathetosis is an athetoid condition in which there is an involvement of one hand, or one hand and one foot only. Bilateral athetosis is a similar condition characterized by an involvement of both hands, or both hands and both feet.

Pusitz presents Zentay's classification of central motor defects and their related peripheral involvements.

> CLASSIFICATION. Zentay has presented a very useful classification of the central motor defects as follows:
> '1. Pyramidal lesions (Spastic Paralysis); Monoplegia, Hemiplegia, Diplegia, Tetraplegia.
> 2. Extrapyramidal lesions (Hypermotility); Hemiathetosis, Bilateral athetosis.
> 3. Cerebellar lesions (Ataxia disorders); Hemiplegia, Diplegia, Tetraplegia.'28

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28 Pusitz, loc. cit.

CHAPTER IV

THE SPEECH THERAPIES

In regarding the problems of children handicapped by cerebral palsy, consideration of their speech handicaps is of primary importance.

> It is difficult to know the total number of cerebral palsied in the United States. It is variously estimated at from 75,000 to 125,000. There are probably about as many as there are victims of infantile paralysis. Out of the public school population in this country of 50,000,000, 300,000 are crippled, 80,000 are deaf and 60,000 are blind. These figures indicate the comparative occurrence of cerebral palsy.1

The condition is one which may affect nearly anyone. There is no correlation between social, economic, or intelligence factors and the occurrence of cerebral palsy. Of the number afflicted with cerebral palsy, it is believed that nearly two-thirds need speech training of some sort.

> When it is realized that these cases require more specialized and prolonged treatment than the latter (infantile paralysis), taking many years to effect, that fully seventy-five percent of these cases have some degree of a speech disturbance, and that marked improvement follows proper therapy in fifty to seventy-five per cent; it can be realized how important a field this is for the speech correction expert.2

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1 Marsee Fred Evans, "Problems in Cerebral Palsy," The Journal of Speech Disorders, XII (March, 1947), 88.

2 M. E. Pusitz, "Speech Correction in Cerebral Palsies," The Journal of Speech Disorders, IV (September, 1939), 206.

The value of such training cannot be overestimated. Because speech gives the child an opportunity for self expression, stimulates mental growth and enhances his possibility of becoming self supporting, it is a vital part of the rehabilitation program. It is difficult for the speech correctionist to know where to begin his training program and how to go about it.

There are certain guiding principles which the speech correctionist must consider in working with the cerebral palsied. He must fully realize that the muscles and organs of speech were not designated primarily for that function, but rather were designed for meeting the basic physical and biological needs of the individual. This is very emphatically stressed by Evans who affirms: "One of the greatest truths for the speech correctionist who would deal with these cases, one which should be 'writ large so that he who runs may read,' is that speech is an overlaid function."[3] Speech then, like piano playing, writing, reading, and any of the other acquired motor abilities, is a learned process. It does not just occur, as do the innate processes which man possesses. When a process is learned, then there must be degrees of ability

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3 Marsee Fred Evans, "Problems in Cerebral Palsy," The Journal of Speech Disorders, XII(March, 1947), 94.

and this introduces a second principle to be noted.

The cerebral palsied individual is an imperfect organism. Therefore the correctionist should remember that it will be physically impossible to achieve perfection as a result of training. Tremendous improvement is often made; but, because of a lesion or congenital maldevelopment, vital neurological pathways are non-functioning and perfection is not possible. "This does not mean that the clinician or the patient should be satisfied with less than is attainable. The highest and best must always be sought, but the limitations must be recognized."[4] "In this discussion the goal we are setting up is achievement of intelligible speech and not perfect or normal speech patterns. Normalcy is not the aim in working with the cerebral palsied."[5]

A third important principle for the correctionist to bear in mind is that he cannot make generalizations regarding any particular case. No two cases are exactly alike. "Each cerebral palsied child is an individual problem. These problems occur in infinite variations, and each must be solved in terms of its own possibilities."[6]

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4 Ibid., p. 95.

5 Maryann Peins, "You Can Help At Home, "The Crippled Child, (August, 1949).

6 Winthrop M. Phelps, "They Are Individuals -- Treat Them That Way," The Crippled Child, (June, 1947).

It is in this respect that the clinician must take into account all of the physical, mental, social and environmental involvements of the particular case with which he is working.

A fourth principle, one which is applicable in any correction program, whether or not it be with the cerebral palsied, is the careful planning of a program. Intelligent plans must be made of the kinds of treatment to be used. The correctionist, in order that the greatest amount of help may be given the individual, must work in close coordination with the doctor, the neurologist, the physiotherapist, the psychologist, the classroom teacher, and the parents in developing the best program possible.

Keeping these principles in mind, the clinician must first ascertain, if possible, that the person is mentally able to gain through speech rehabilitation work.

> Careful studies of the intelligence of cerebral-palsied children place approximately 30 per cent in the feebleminded group and 5 per cent in the superior group, the remaining 65 per cent falling within the range of normal intelligence. Speech training for those suffering from extreme amentia is either contra-indicated or should be limited to the establishment of the minimum speech required for expressing the individual's needs. For the intellectually normal individual handicapped by cerebral palsy, speech training should be stressed, since self expression is limited in other areas.[7]

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[7] Robert West, Lou Kennedy, and Anna Carr, The Rehabilitation of Speech (revised edition; New York: Harper & Brothers, Publishers, 1947), p. 430-31.

Unless the child has sufficient intelligence, it is futile to undertake an extended and costly speech rehabilitation program. Therefore, the clinician should attempt to accumulate information concerning the intelligence of the cerebral palsied person from competent sources.

> Mental deficiency is often associated with diplegias and may assume a severe form of idiocy or a relatively mild slowness in development. Many of these children are, however, exceedingly bright and attend universities and professional schools. Therefore, prognosis regarding the mental status should be guarded.8

Dr. Phelps stresses this point very explicitly when he says that . . . . "obviously, in cerebral palsy, the child cannot respond with motor skills he does not possess. This means that standard intelligence tests, used in schools for mass examinations, must be adapted to the needs of the case."[9]

In the testing of the intelligence of normal children there are frequently conflicts of opinion over the estimated intelligence. It does not seem unusual then that in such testing of the intelligence of the cerebral palsied, which is complicated by a lack of motor control, there is an even greater difficulty in arriving at a decision as to

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8 Roy R. Grinker, Neurology (third edition; Toronto: Ryerson Press, 1936), p. 877.

9 Winthrop M. Phelps, "The Cerebral Palsied Child Goes to School," Hygeia, XXVI (April, 1948), 273.

the individual's intelligence. The intelligence quotient is a reasonably good measure of intelligence only when we have determined that given factors, other than intelligence, have not affected the child's performance to a significant degree.

The lack of motor control and coordination is not the only factor which would bear such significance. Frequently the child suffers from a lack of the environmental stimulation which motivates good mental development. The child may also have other defects resulting from injuries to other portions of the brain which may affect his vision, hearing, or other senses.

The speech clinician must then formulate as much information as possible regarding the medical diagnosis and prognosis of the individual case. He should be familiar with any conditions of the individual which might involve limitations of activities.

It is only after such information has been gathered, interpreted, and evaluated that the speech correctionist should begin working with the problem.

The next step in the procedure of treatment of the cerebral palsied is a testing of the speech and hearing of the individual. Berneice R. Rutherford made a study of the loudness, pitch, rate, rhythm and quality of the speech of children handicapped by cerebral palsy.

> These data suggest, however, as has been stated, that there is some difference in speech reactions between the two CP groups. They seem to differ in rate and rhythm trends, and in the proportion of voices which are loud, low-pitched, monotonous, or breathy. The CPex (athetotic) group seems to tend toward slower, more jerky speech than the CPp (spastic) group. In the CPex group there are also more loud voices, more low-pitched voices, and more monotonous or breathy voices.
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> Examination of the agility of the speech musculature and breathing apparatus seems to point to at least a partial basis for this difference. The attributes and qualities differentiating the two groups--i.e., rate, rhythm, loudness, low pitch, monotony and breathiness--seem to be definitely related to control of the breathing aparatus.
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> The difference between the two CP groups in breath control and in mobility of the speech musculature suggests that a difference in therapy for CPex and CPp groups is indicated.
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> . . . . . .
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> This study seems to indicate that there is no special speech which is characteristic of all children handicapped by cerebral palsy; that there is a difference with respect to some speech trends between the two main groups of cerebral palsy; and that a difference in therapy for CPp and CPex groups is indicated.10

The speech testing of the cerebral palsied will prove that the speech difficulties exhibited will be very similar to those exhibited by children having speech defects and possessing a normal motor ability. The primary distinction is, however, that the normal child's difficulty is basically

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10 Berneice R. Rutherford, "A Comparative Study of Loudness, Pitch, Rate, Rhythm and Quality of the Speech of Children Handicapped by Cerebral Palsy," The Journal of Speech Disorders, IX (September, 1944) 270-71.

a functional one, whereas the cerebral palsied child's is structural. The speech defects are not isolated as such, but are an integral part of the cerebral palsy itself. The speech defect must be treated as a part of the whole program of rehabilitation.

It has been pointed out that there are no two cerebral palsy cases which are exactly alike and therefore the speech difficulties will vary from case to case. For this reason, and for those pointed out by Berneice Rutherford,[11] it is difficult, if possible at all, to describe spastic, athetotic, rigid, or ataxic speech. The speech characteristics of any particular type of cerebral palsy are not distinctive enough to warrant specific classification. It is possible, however, to note some very general deviations.

1. The spastic may exhibit what Evans calls general spastic speech, of which there are two types. "With one group there is an inability to make the speech mechanism perform."[12] Regardless of the effort put forth the articulators will not react to produce speech. The second type . . . . "shows the ability to make the speech sounds separately in a clinic situation, but a

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11 Ibid., pp. 263-71.

12 Marsee Fred Evans, "Problems in Cerebral Palsy," The Journal of Speech Disorders, XII (March, 1947), 96.

seeming inability to carry over to words, phrases, sentences."[13] There might also be unusual deviations in the pitch and quality because of the involvement of spastic laryngeal muscles. Occasionally the difficulty will be articulatory because of malocclusion or because of a tongue which is spastic. Nasality may also be present if the spasticity involves velopharyngeal control. Many of these same traits are exhibited by the rigidity type of cerebral palsy.

2. The speech of the athetoid and ataxic is not basically a speech problem. The speech of these children is usually blurred and indistinct giving the impression that they are able to make the sounds clearly, but that they speak carelessly.

It is difficult in some respects to isolate the treatment given for any particular type of cerebral palsy. The same basic therapies may often be applied to more than one type and its adaptation is governed by the individual case. One major point to note is that athetoids and ataxics profit little from repeated drills. It has been observed that these two types will exhibit speech difficulties which are inconsistent; that is, their production of a given sound in a particular word may be satisfactory or unsatisfactory at any time. The mispronunciation of the sound is not con-

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13 Loc. Cit.

sistently wrong. On the other hand, the spastic will exhibit consistent defects in speech. If a particular sound is faulty, it is always faulty. Thus it can be assumed that only the spastic will profit sufficiently from repetitive drills.

The beginning of the actual therapeutic treatment for the cerebral palsied is the establishment of good rapport between the speech clinician and the patient. Rapport is of the utmost importance and the patient must be accepted wholeheartedly. Caro Hatcher says that the clinician must exhibit a . . . . "willingness to touch a drooling chin, listen to breathing snorts without noticeable reaction, and show no concern when an involuntary movement of arm or leg causes our hair to be ruffled."[14] The importance of establishing good rapport cannot be overemphasized for much of the success of the whole program relies upon it.

In many cases the spastic will exhibit drooling, improper breathing, lack of attention span, as well as many other such obstacles to the production of speech. Before drill on any of the specific speech sounds is begun, regardless of the type of cerebral palsy disorder, the clinician must tackle the job of correcting the conditions mention-

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14 Caro C. Hatcher, "Athetoids Relax and Speak," The Crippled Child, (June, 1949).

ed above. These problems, as well as the overall speech problem, may be attacked through the use of relaxation.

> The fundamental steps in teaching speech to spastic and athetoid children do not differ greatly. In either case, relaxation is essential before any other form of treatment is instituted. It should be pointed out that the patient with true athetosis can generally show no improvement without relaxation.15

The importance of relaxation is further pointed out and emphasized by Marsee Evans.

> Several kinds of therapy have been found effective. Someone has said that there are three ways to treat the speech of the spastic paralytic: first, relaxation; second, relaxation; and third, RELAXATION! That is all very good, but how will you achieve relaxation ? But speech is generally improved in direct proportion to how well you do achieve it.16

In formulating lesson plans by which to work, the relaxation should preceed any given speech training. "Relaxation of speech organs cannot be induced until there is general relaxation."[17] To avoid any misunderstanding, especially in the treatment of younger children, the place for play and the place for relaxation, as well as other training, should be separate and not interchangeable. Gnerally, it is easier to achieve relaxation if the child is lying down. A comfortable room temperature along with

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15 M. A. Perlstein and Marie Shere, "Speech Therapy for Children with Cerebral Palsy," American Journal of Diseases of Children, MXXII (October, 1946), 389-398.

16 Evans, op. cit., p. 97

17 Perlstein and Shere, loc. cit.

the exclusion of outside stimuli will also contribute in gaining relaxation. In many cases it may be necessary, in order to help the athetoid relax, to use cotton ear-plugs and a blindfold. Carlson[18] mentions that having the child do things which will require sufficient attention and concentration will help him in attaining relaxation since his attention is centered on what he is attempting to do rather than the muscular effort and coordination required in doing the particular task. Thus the child begins to learn to willfully exclude the excessive stimuli. "Speech always improves when the child learns to inhibit the excessive sensory stimuli which are irrelevant to what he is doing. In this respect, he resembles the speaker in his attempts to overcome stage fright."[19]

Perlstein and Shere suggest that "Relaxation may be encouraged by gently tapping the face, neck and shoulders; by rolling the head from side to side, and by grasping the chin and shaking it gently."[20]

The speech clinician must allow sufficient time for spasms to subside. With older children this period of

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18 Earl R. Carlson, Born That Way (New York: The John Day Company, 1941), 174 pp.

19 Earl R. Carlson, "Give Them Education," The Crippled Child, (December, 1947).

20 Perlstein and Shere, loc. cit.

time can be spent in reviewing certain objectives stressed in previous lessons or previewing those of today's lesson. With younger children, casual, easy-going chatter about events of the day, or some coming event, may be used.

In attempting to help the child gain the ability to relax, it must be remembered that the direction of the therapy is toward "conscious" relaxation. The child should be taught to recognize the difference between tense and relaxed muscles. Much of the ability to relax is the result of a feeling of confidence. Every effort should be made to see that he retains his feeling of security since it is necessary that the child carry the relaxation which he has learned into his other activities.

In conjunction with the establishment of relaxation, the subject of drug therapy arises. It would seem that medical science would be able to develop drugs with specific relaxing effect which could be used in treating cerebral palsy. There exist now certain drugs which accomplish this, but they tend to have a sleep-inducing effect. One such drug is alcohol, which often brings about a relaxing effect. Its method of action in cerebral palsy is not known, but its main effect is to relieve tension. That one has more coordination when slightly inebriated is noted by Dr. Perlstein when recalling a description of this by Dr. Carlson. "Dr. Earl Carlson aptly describes individuals

who are 'more sober when drunk than when sober'."[21] Therefore, alcohol may be recommended for certain types of cerebral palsy, especially the athetoid.

There is a new drug which seems to act primarily on the midbrain and is used in the control of the petit mal form of epilepsy. This is tridione and it has a relaxing effect similar to alcohol. "It is most valuable in the athetoids and least in the spastics. Although it does not benefit all athetoids, some improve dramatically."[22] However, continued use of tridione may result in toxic effects and complications. Its extraneous effects are more severe in adults than in children.

It would seem logical to conclude that drugs which have a paralyzing effect would prove beneficial in the treatment of the cerebral palsied since the condition is so frequently characterized by rigidity, tension, or stiffness in the muscles. "The drug acts in preventing nervous impulses from reaching the muscles by blocking them at the muscle-nerve junction. In small doses the drug causes relaxation."[23] There are many serious disadvantages to the drug, the greatest of which is the short span of time that the effects last.

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21 Meyer A. Perlstein, "The Current Status of Drug Therapy in Cerebral Palsy," The Crippled Child, (August, 1949).

22 Loc. cit.

23 Loc. cit.

There is also little difference between the therapeutic and the lethal dose.

Probably the best known drug used in the treatment of cerebral palsy is prostigmin.

> Prostigmin has caused considerable controversy since it was first recommended for use in cerebral palsy. After it was given publicity in a national lay magazine, there was a "run" on the prostigmin market by all people who had or thought they had cerebral palsy. Parents demanded from their physicians that the drug be given to their children. When the physicians hesitated, parents sometimes went out and employed prostigmin on their own responsibility. 24

Prostigmin produces relaxation through its action on the spinal cord.

> In athetosis where the arms are in rapid continuous motion, prostigmin would only make the arms move faster.
>
> However, in such cases as the rigidities, where the muscles are rigid and do not move well, prostigmin will definitely bring about an increase in the facility of use of the muscles. In spasticity, it may seem that the muscles are tight and stiff, and it may be thought that therefore prostigmin will release that stiffness. However, spasticity is actually an extremely rapid and tense series of motions in a muscle, and prostigmin will step up this rapidity.25

There are other drugs which are used with the cerebral palsied, such as myanesin, which is especially beneficial to athetoids; belladona, atropine, stramonium, which benefit the rigidity and tremor groups; and several others.

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24 Loc. cit.

25 Winthrop M. Phelps, "Questions Parents Ask with Answers," The Crippled Child, (August, 1947).

Regardless of the effect of any drug in the treatment of cerebral palsy, drug therapy should serve only as an aid in the overall program of rehabilitation. "Medication is not a substitution for training; it is merely an aid."[26] The administration of any drugs must be under the careful supervision of a competent medical person.

Among cerebral palsied children there are often evidenced difficulties in breathing. Many of these children, spastics in particular, have true "reversed breathing."

> In normal breathing, the chest and the abdomen should rise and fall together. In reversed breathing one will rise as the other falls due to a reversal of diaphragmatic movement. This type of breathing can be observed either directly or by placing one light weight object on the chest and another on the abdomen infrasternally.27

The speech clinician should be thoroughly familiar with the mechanics involved in the process of breathing before he makes any attempt to do corrective work on a reversed breathing pattern. Any exercises conducted to correct this condition should be masked by accompanying activities. Evans asserts that most standard breathing exercises will suffice and that rhythm should be emphasized. He further states that "Good breathing should be practiced from the prone, supine and side-lying positions. After

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26 Perlstein, loc. cit.

27 M. A. Perlstein and Marie Shere, "Speech Therapy for Children with Cerebral Palsy," American Journal of Diseases of Children, MXXII (October, 1946) 389-98.

there has been some improvement the patient should do the same work sitting up and, finally, in a standing position and while walking."[28] The importance of correct breathing is affirmed by Marguerite Fischel who states that . . . . "unconscious proper breathing is, of course, a fundamental necessity for ease of tone."[29] For specific treatment of reversed breathing patterns, see Appendix, page 59.

When the breathing pattern has become somewhat normal, the speech correctionist should then begin exercising the basic mechanism of speech. There should be instituted a program of exercises which will call for tongue gymnastics. The movements of speaking and eating have a similar origin and it follows that progress in the latter would insure progress in the former. It is on this theory that Froeschels bases his chewing method as a special corrective technique.

> Dr. Froeschels has based his method on the obvious fact that chewing is one of the functions of those organs which produce speech. Moreover, as there is only one set of muscles and nerves for both seemingly different functions, those of speaking and chewing, and since the two kinds of movement do not interfere with each other, these functions must be identical, for chewing and speaking can be performed at the same

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28 Marsee Fred Evans, "Problems in Cerebral Palsy," The Journal of Speech Disorders, XII (March, 1947) 97.

29 Marguerite K. Fischel, The Spastic Child (St. Louis: The C. V. Mosby Company, 1934), p. 53.

time.30

The speech clinician should first explain some of the fundamental movements of speaking and chewing to the patient. The patient should then chew in the ordinary manner, with the lips closed. It can be called to his attention that the tongue is in constant movement. The patient is asked to allow sounds to escape while in the process as though he were chewing noisily.

> If the chewing is performed correctly, with various movements of the lips and tongue, a great variety of sounds will escape from the mouth. If uniform sounds like 'ham-ham-ham' are heard, the lips and tongue do not move sufficiently. Correctly performed, chewing gives the sound impression of a foreign language.31

When the treatment is first begun the patient should chew several times a day, but for periods which are very short. The length of time of continued chewing is regulated by the progress of the patient.

> It may be necessary at first for the therapist to assist the weak muscles. Chewing motions are often particularly difficult for the child. He should practice on actual food, yet because of his difficulty the food given him is usually so soft that he cannot chew it, no matter how much he tries. In such cases caramel or taffy candy should be substituted. A rather large, tough but well flavored piece of meat offers good chewing practice. Gum chewing is excellent because it pro-

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30 Elly Sittig, "The Chewing Method Applied for Excessive Salivation and Drooling in Cerebral Palsy," Journal of Speech Disorders, XII (June, 1947) 191.

31 Loc. Cit.

> vides an opportunity for continuous chewing and swallowing. Needless to say, the therapist is always watching while such exercises are in progress.32

The use of chewing activities not only aids in the development of the mechanical movements of speech, but it also helps in working with the problems of drooling, opened-mouth, and excessive salivation. If the child is prone to leaving his mouth continually open then it only follows that he will drool. This is easily verified, for if one attempts to swallow while his mouth is open, it will be noted that the process is difficult, if not impossible. The application of the chewing method to combat drooling may activate those muscles required in the control of mouth closure, and thus bring about the voluntary control of drooling.

After the child has begun to master some of the basic problems in this respect, the speech clinician should proceed to reading-chewing.

> The next step in the treatment consists of reading, which should be frequently interrupted by 'meaningless' chewing. During conversations in the patient's language he should be reminded that he must <u>think</u> of chewing, and that he may once in awhile mingle some meaningless chewing with 'English chewing'33

Each patient should be treated individually and there

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32 Perlstein and Shere, <u>loc. cit.</u>

33 Sittig, <u>op. cit.</u>, p. 192.

should be no group treatment. The sessions should be short, but frequent. Although it would seem that the process would benefit only the movement of the articulators, Sittig[34] notes that the chewing technique is an excellent method of ridding the voice of many kinds of muscle constrictions.

The speech clinician then begins the process of developing speech sounds. This may consist of easy repetition of sounds or groups of sounds. "Quiet emphasis is given to 'speaking with the mouth only'. The child will frequently catch himself making extraneous movements."[35] It is here that a mirror will come into use. Care should be exercised however to be sure that work in front of a mirror is desirable. "Some children react unfavorably to mirror work. If such reaction is observed, the mirror work should be omitted until such time as the child will enjoy and profit by it."[36]

This point is further substantiated by Gratke who states that "Some children can use the mirror to very good advantage in eliminating grimaces. On the other hand, some severe athetoids are upset much more than helped by

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34 Loc. cit.

35 John C. Snidecor, "The Speech Correctionist on the Cerebral Palsy Team," Journal of Speech and Hearing Disorders, XIII (March, 1948), 68.

36 Perlstein and Shere, loc. cit.

seeing their own grimaces.[37] The mirror may also prove useful in the work to eliminate the opened-mouth, drooling, and excessive salivation.

It is a general rule in working with speech defective children that the therapy is begun with those sounds which are easiest for the child to observe. This will frequently hold true in working with the cerebral palsied. However, there are some cases in which it would be advantageous to begin with those sounds which are already reasonably well developed. In other words, begin with the sounds he has and proceed to the sounds which he has not.

The process of teaching the isolated sounds to the cerebral palsied is quite similar to the process used in working with other serious speech defectives. The clinician should use all the avenues open to him in conveying to the child the proper way to make any given sound. He should utilize the senses by presenting the sound through auditory, visual, and motokinesthetic stimuli. Thus, if the child fails to see the sound or hear it correctly, he may make progress through the feel of the sound. It is well to use all three methods with each sound rather than

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37 Juliette M. Gratke, "Speech Problems of the Cerebral Palsied," The Journal of Speech Disorders, XII (June, 1947), 133.

just one, for it follows that the carry-over will be stronger and more rapid if this is done.

When the child becomes able to say simple nonsense syllables, the work should proceed toward vocalization of short words. Care should be taken to make sure that the child hears all of the sounds in the word and attempts to make all the sounds. It is especially true of spastics that final sounds are omitted. If the child has difficulty in closing on a word, Evans[38] suggests a game with which results were satisfactory. A long word is selected such as Chattanooga, Constantinople, or Indianapolis. Using the word Indianapolis as an example, begin with the initial syllable. As he says each syllable he taps his finger on the table. The first syllable is said, then the first is repeated adding the second; the first and second are repeated adding the third; and so on to the end of the word. The finger is tapped continually and the patient works to attain a smooth easy flow with rhythm. When the word is finally completed he says it again three times as rhythmically as possible, clapping his hands each time he says the word. "This, too, puts the child's attention and emphasis on the goal to be achieved rather than on the way in which it is done. This is always of value."[39]

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38 Evans, op. cit., p. 98.

39 Loc. cit.

As the child progresses and he gains some ability to say words, the clinician should proceed to short poems, sayings, slogans, and nursery rhymes. Again rhythm is stressed in these exercises. When these have been reasonably well accomplished, speech games, story telling, and singing may prove beneficial. All types of cerebral palsied patients will benefit some from these articulatory drills as would the average speech deviate, but it should be stressed again that it is the spastic who will derive the greatest benefit from repetitive drills. For additional articulatory drills, see Appendix, page 60.

When the cerebral palsied child is educable, and he receives the benefits of a good rehabilitation program, well administered, it is to be expected that progress will be made. It is difficult to predict what progress will be made and at what rate it will be accomplished for there are many factors in each individual case which have a definite bearing upon the progress which will be made. The complex pattern of involvements resulting from cerebral lesions may result in such things as poor vision, hearing deficiency, association disturbance, and many other things which will have a direct effect upon the acquisition of good speech. As in treating any other type of speech

defect, the clinician should refrain from making any definite statements to the individual or his family concerning prognosis. Any statements he makes must be carefully qualified, for the clinician has no way of knowing for sure if any progress will occur.

CHAPTER V

IN CONCLUSION

The author has presented some of the theories of the contemporary leaders in the field of cerebral palsy. In attempting to evaluate the material presented it would seem logical to make some general comparisons between the theories of these various authorities. If the author finds that there is a variance of opinion among the leaders in the field, no attempt will be made to determine which technique, definition, or description is superior.

The field of cerebral palsy, from the rehabilitation point of view, is in its early infancy. Great strides of progress have been made, but there is much yet that is unknown. The author finds that there is positive agreement among the leaders in this field on nearly every point concerning the cause of cerebral palsy. Those differences which do exist are in matters of definition and origin of cause, as opposed to the neurological area affected. The differences, however, are such that they make no actual dissimilarity in the whole picture.

The methods of therapy in the rehabilitation of the speech of the cerebral palsied may vary, but the objectives of the therapy are the same. All are in definite agreement

that the most beneficial treatment is the establishment of relaxation, and especially "conscious" relaxation. The spastic definitely needs repetitive drills on speech sounds, as does the rigidity patient. The athetoid and ataxic will show decided speech improvement when they are able to attain conscious relaxation.

> One very happy thing about cerebral palsy is that (within certain rather wide limits) practically anything you do for the patient will help him to improve. If he is of average or better intelligence, and the majority of them are, he has great potentialities locked in the prison of a defective body. Any improvement you can make, or help him to make, in the functioning of that defective mechanism will help to free those potentialities and make for him a fuller life.1

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1 Marsee Fred Evans, "Problems in Cerebral Palsy," The Journal of Speech Disorders, XII (March, 1947). 101-02.

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APPENDIX

APPENDIX

Specific Procedures In The Speech Treatment Of The Cerebral Palsied

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I. There are certain items of equipment necessary for the speech room. Among these items should be listed: (1) a couch and pillows, (2) mirrors large enough for the therapist and the child to see eahh other at the same time, (3) a hand mirror, (4) tongue depressors, (5) tissue handkerchiefs, (6) gauze, (7) towels, (8) sandbags, (9) a table, (10) chairs and (11) a cupboard or bookcase.

Other items which make the therapy more interesting and effective are: 1. A record player and records. These are used for relaxation, coordination, rhythm and speech motivation. 2. A mirrophone or a permanent recording machine. The latter instrument is useful in letting a child hear his own speech. However, one should be watchful to guard against any undesirable psychologic effect which might follow when the child realizes that his speech is unintelligible. Most children are fascinated by the recording machine and like to work with it. 3. Rag dolls. These are used to teach relaxation and to motivate speech. 4. Animals of wood, pottery or cloth. They are used to motivate beginning speech. Also, they usually have their tongues out--which prompts little boys and girls to do likewise. 5. Pictures of children yawning, blowing bubbles, dressing themselves and singing. 6. Bubble pipes. 7. Whistles. 8. Lollipops. 9. A jar of peanut butter. 10. A play table with blocks and pegs. 11. A toy xylophone. This is excellent for accompanying "Rock a Bye Baby." 12. A toy telephone. 13. A big "sailor boy" face with a string in his mouth to teach breath control. 14. A blackboard. 15. A bulletin board. 16. Games. 17. Story and picture books. 18. Candles and matches.1

M. A. Perlstein and Marie Shere, "Speech Therapy for Children with Cerebral Palsy," American Journal of Diseases of Children, MXXII (October, 1946), 389-398.

II. The following is a proposed program for teaching the cerebral palsied to suck through a straw.

> To teach a child to suck through a wax or cellophane straw, parents are advised to purchase a one-foot length of dental rubber tubing which has an internal diameter about equivalent to that of a wax straw and which has a wall thick enough so that the tube will open again immediately when bitten. The exterior diameter of the tube should be less than half an inch. One end is dipped into a fluid which the child particularly likes. Some children prefer gravies and meat extracts and others prefer syrups. The finger is placed over the other end of the tube and from 2 to 3 inches of the tube is thus filled with the fluid. (Before using a rubber tube for the first time, the parents are cautioned to wash it out well so that there is no rubber taste.) The tube is then held horizontally and the fluid is allowed to run. into the child's mouth. This is done at a definite hour, at least once a day-- preferably two or three times -- and is done four or five times each period. This schedule must be rigidly observed. This point is essential since this is a conditioning program. The process of holding the tube horizontally is carried on from four to six weeks, or until the parents realize that the youngster is aware that the tube contains a very desirable liquid. When this awareness is noticed, the parent next dips the tube into the solution and raises it to the child, this time holding the tube slightly below the horizontal so that it will not flow. The child is then encouraged to put his lips around it and see if he can find the taste. The tube is raised to the horizontal several times and lowered again below the horizontal so that the youngster begins to want to work his tongue into the hole, and pull it away and this tends to produce a weak sucking motion. The parent manipulates the freedom of flow with his finger. When a child can suck with the tube held two inches from the horizontal at the end farthest from the mouth, the tube should be brought down a littl e, about once a week. Each time it should be moved down from the lower position until the child is definitely able to suck. 2

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2 Martin F. Palmer, "Studies in Clinical Techniques," The Journal of Speech Disorders, XII (December, 1947), 416-17.

III. In attempting to teach the child to chew gum, Palmer suggests the following program.

> The process of teaching a child to chew gum is a conditioning experiment similar in many respects to teaching a child to suck through a straw. A stick of ordinary chewing gum is just as satisfactory as a piece of bubble gum for this purpose, although bubble gum, being pink, is somewhat more attractive to children and the consistency is somewhat better than ordinary gum. A piece of gum loses its first sharp flavor about a minute after it is introduced into the mouth, and it is at this time or after that the child will attempt to swallow the gum if he does not know how to control it. It is a very simple matter to prevent this. A child is given a small piece of gum, the amount of it (the number of sticks or parts of a stick) depending on the size of the child. This is rolled up and placed in his mouth. The individual should do this at a certain hour each day, using a watch for exact timing. (He may do it more than once, but once daily is sufficient.) At the end of 40 seconds, the finger is inserted into the mouth and the gum is retrieved. This is done for about a weekto two weeks. At the end of the first period, the time is increased by ten seconds again until the child is chewing for many minutes without swallowing. He gradually begins to understand that gum is an article which is not to be swallowed. If the tongue is unable to handle gum, special techniques, which can only be carried out in the clinic, will have to be used.3

IV. In the treatment of breathing difficulties, Perlstein and Shere suggest the following techniques.

> . . . . breathing exercises should be masked by accompanying activities. Some of these activities which encourage breath control without calling the child's attention to his breathing are singing, reciting memorized poems, playing wind instruments,

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3 Ibid., p. 417.

blowing soap bubbles, blowing out candles, blowing on a candle enough to move the flame but not extinguishing it, holding a piece of tissue paper against the wall with the breath stream, blowing a feather but not allowing it to fall, pulling a string from a clown's mouth and vocalizing a prolonged "ah," panting like a dog, and laughing (beginning with a slow "ha-ha-ha" and going faster, until the imitation laugh has turned into a genuine diaphragm-shaking chuckle). An interesting breathing exercise which also aids the muscles of voice production is suggested by Emil Froeschels: "The patient is advised to clench his fists, to raise them to the nipples, and to push them down with great strength, synchronically speaking a vowel, a syllable, shorter and then longer words, and so on. "7.4

V. To teach non-visual sounds, the clinician can utilize the patient's motokinesthetic abilities in the following way.

Tell the child a story about a big old bullfrog, for instance, and have him sound out the way the bullfrog does, "guh, guh, guh". With this kind of introduction, you may then show the child how you make the sound "g". Let him place his hand on your throat to "feel" the sound as you say it. Then he can put his hand on his own throat and try "g". For contrast between the "g" and "k" tell a story using the sound "k" so that the child will hear and feel the difference between the production of "g" and"k". A story about a duck who says, "quack, quack" will demonstrate the "k" sound. Once a new sound has been learned, it must be strengthened by using it in short syllables -- "ka, ka", for instance, in connection with the "k" sound. Mother can ask, "What does the crow say?" (Ka, Ka). From short syllables, the next step is simple familiar words that the child knows -- usually the names of animals, objects in the house, names of persons, things, etc.5

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4 Perlstein and Shere, loc. cit.

5 Maryann Peins, "You Can Help At Home," The Crippled Child, (August, 1949).

VI. Smaller children enjoy adaptations from nursery rhymes. For instance, the child says, 'One, two, button my shoe,' taking a step with one foot (the dominant one) on 'one,' and a step forward with the other foot on 'two' leaning over as far as his balance will permit and imitating the motion on 'button my shoe.' He steps forward on 'three,' again on 'four,' a wide sweep of imitative gesture with the dominant hand on 'close the door,' and so on to the end of the rhyme. One badly crippled little boy was delighted with his achievement, and I think, received some speech benefit from walking and saying the rhyme 'Ten Little Indians.' He took a step forward with the dominant foot while he said, 'One Little,' another step with the other foot on 'two little,' a third step on 'three little,' and brought the lagging foot up parallel to rest a minute on 'Indians.' This action was repeated on the next phrases, 'four little, five little, six little Indians,' and 'seven little, eight little, nine little Indians.' Then (with a great deal of help from the clinician) as he said, 'Ten little Indian boys,' he jumped in the air and tried to turn completely around. As he counted Indians from ten to one, he walked back to the starting place. This simple exercise took the little fellow several minutes to perform but it was helpful to him both in his speech and his physical balance. He finally learned to control himself enough to jump around alone.6

For additional techniques in articulatory drills, chapters 15, 16, and 17 of West, Kennedy, and Carr[7] are suggested.

For additional techniques in relaxation, see Jacobson.[8]

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6 Marsee Fred Evans, "Problems in Cerebral Palsy," The Journal of Speech Disorders, XII (March, 1947) 98-99.

7 Robert West, Lou Kennedy, and Anna Carr, The Rehabilitation of Speech (revised edition; New York: Harper & Brothers, Publishers, 1947), 650 pp.

8 Edmund Jacobson, Progressive Relaxation, (Chicago: The University of Chicago Press, 1929), 429 pp.