

## SPEECH DEVELOPMENT IN CRIPPLED CHILDREN. REPORT OF ONE HUNDRED AND TWO CASES.\*

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ONE of the psychological problems of the crippled child is that of the voice and speech. A recent survey of one thousand and forty-four (1044) cases admitted to the Orthopaedic Hospital-School, of Los Angeles, during the years 1918-1919-1920-1921, shows that eighty-two (82), or over seven and one-half ( $7\frac{1}{2}$ ) per cent., had, with their orthopaedic trouble, some form of speech defect. In reality the survey does not include two hundred (200) cases admitted prior to 1918 and in which there was no mention made of any existing speech defect. Applying the percentage of the later admissions to these two hundred (200) cases will give fifteen (15) more cases probably existing but not mentioned, owing to the fact that the diagnosis and treatment of speech defects was not being made at that time. A grand total then of ninety-seven (97) cases out of one thousand two hundred forty-four (1244) orthopaedic admissions gives a percentage of about eight (8) per cent. Contrast this figure with the percentage of speech defects in school children of the United States and Europe, namely, one (1) to two (2) per cent., and the enormous relative disproportion is apparent at a glance. In other words, there are from five (5) to ten (10) times as many speech defect cases amongst the handicapped as there are amongst a similar number of other children of school age.<sup>9</sup>

It is evident that some special reason should exist for this great disproportion, and that reason is undoubtedly found in the nature of the pathological processes that are the cause of the various motor paralyses, incoordinations and ataxias. Whether crippled children have a more unbalanced nervous system, due to their hypersensitiveness, is not taken into consideration in this article, but is undoubtedly a factor in the large percentage of speech defects found amongst them.

Birth injuries, resulting in motor paralyses of one or all of the limbs, often include damage to the speech centers in the cerebral cortex and to the central nuclei, caudate, lenticular and red and optic thalami with injury to the speech area.

Polio-encephalitis (Strümpell), with resulting motor paralyses as a sequel to the cerebral lesions, occasionally attacks and may damage the speech centers; in fact some cases in this list are of encephalitis.

In general terms it may be stated that any pathological process, whether it be inflammation (intracranial or intraspinal) at or after

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birth, or trauma resulting in the actual loss of substance, the formation of cysts, cicatricial bands or pachymeningitis associated with the integrity of motor or sensory areas of the brain, including those of speech, will of necessity result in either lack of sensory perception of the spoken or written word or failure to develop speech, either written or spoken, or both.

The faculty of speech is one of the intricate muscular coördinations, and when the power to coöperate the various parts of the speech function—namely, ideation, respiration, phonation and articulation—is lost from any cause whatever, language production will either be entirely absent or imperfect.

When we remember that speech is a form of motorized thought,—motion picture ideas in fact,—and that gesture is the primitive speech racially, we realize how impossible it is for a case of disordered muscular coördination<sup>2</sup> or motor paralyses of one or all of the limbs to develop that stage of seemingly purposeless muscular activity with cooing, that comes between birth and the time of development of the spoken word. The crippled child cannot lay the foundation for spoken and written speech and gestures (O'Shea,<sup>8</sup> "Linguistic Development and Education").

The normal child has learned to respond by appropriate acts to its doll, bottle, etc., and to hundreds of other objects. These habits are essential to the formation of language habits. (Watson, John<sup>10</sup>: "Behavior," pp. 328-329.) The crippled, the spastic, the incoördinated child cannot form habits of response to objects, and its language development may be hampered, delayed, undeveloped, by reason of its physical handicap.

To the paralyzed child is denied even the hope of learning to express the thought by the so-called manual form of speech training used with deaf children.

### THE IMPORTANCE OF THE KINAESTHETIC MEMORY.

In health every muscle movement is registered in the muscle memory center or movement memory centers in the cerebral cortex. Muscle movement memories spring from previously existing memories stored in the brain<sup>3</sup> and no voluntary or conscious muscle movement is possible without first calling on the already stored memory. If normal children with normal speech have placed in their brains, through endless repetition, perfect muscle movement memories, these can be evoked and through a perfect coördination of the necessary systems, normal speech is produced.

The paralyzed, incoördinated, atrophic or spastic child, who has uncontrolled or unintelligible gestures or no purposive movements or no speech or imperfect speech, has, of necessity, stored in his brain only imperfect muscle memories. Voluntary movements must be sec-

ondary not primary functions of our organism.<sup>5</sup> It follows then that in the crippled child, only imperfectly executed muscular movements will result when the effort to gesture or speak is made.

A concrete example of the working of imperfect muscular memories is seen in the imperfect speech of the cleft palate case even after a perfect operation for closure of the palatal defects has been done. The physical mechanism may be in a normal condition but the memories of muscle movement, already stored in the brain by the child, are the imperfect ones resulting from the use of the imperfect physical mechanism. In the reëducation of the cleft palate case each sound has to be remade correctly by him a sufficient number of times until the perfect record is indelibly impressed on neurons in the brain center, whence it may on occasion be called forth by the demands of speech.

Realizing that many orthopædic cases take months and even years of treatment, it becomes imperative to provide a suitable form of speech training for the development of speech where it does not exist and for the correction of defects when they are present.

Many of the speech defect cases herein mentioned had some endocrine disturbance. Endocrine treatment and supervision has been of value in many of the cases. Recognizing the importance of the internal secretions on the regulation of function, the appropriate endocrine medication has been prescribed by Dr. Clifford A. Wright in every case where indicated, before the speech training was begun.

Speech in a normal child develops after a cooing, seemingly purposeless, bilateral movement period.<sup>6</sup> In crippled children there is no such "pre-speech" period and when the child's desire for expression has grown to a point where it demands motion or action, there are no muscular movement memories, no trained, coördinated movements to be utilized; first as gestures, then as oral or written speech.

The development of speech and the correction of speech defects, it was realized, was but a part of the training in muscular coördination and all but five (5) of the cases were under the care of the Orthopædic Hospital-School staff.

The lack of control of the muscular system and its hyperaction, so characteristic of the spastic case, is manifested in an inability to make and maintain the proper moulds or shapes for vowel and consonant sounds, hence, the rough, rasping voices of such children. The spastic lacks inhibition, smoothness, rhythm, balance and tone inflection. Few are able to whistle or sing a tune and their breathing is generally very shallow.

#### DROOLING.

A very noticeable feature of many crippled children is the drooling or overflow of saliva

from the mouth over the lower lip. This results often from the palsy of the cheek, tongue, lip and pharynx muscles, or sometimes the drooling results from a muscular incoördination or a spastic condition of the salivary glands. The strengthening and coördination of muscular effort that comes from speech drill has a markedly beneficial effect on the drooling; in many cases causing it to disappear entirely.

#### THE SPEECH DEVELOPMENT.

It must be seen at the outset that no speech development independent of the training of the other muscular systems can be undertaken with any hope of success. The spastic's entire controlling, inhibiting power is undeveloped and must be brought to a degree of practical use before real progress can be made. For this reason the orthopædic surgeon puts at rest the hyperacting limbs, and nervous energy ceases to be lost. Various surgical operations, followed by suitable casts, braces and physio-therapeutic treatment, will stop the most of the loss of nervous energy (motor activity is a biological necessity for development) and it is only after some degree of coördination of muscular effort is attained that the spastic can begin to use his hands to grasp things within the reach of his tactile sensation. Repetition of movement leads to habit formation<sup>3, 4</sup> and to the placing of a definite muscle movement memory in the brain. The entire range of muscular movement memories must be removed and by re-education and coöperated movement, the kinæsthetic sense developed. The speech machine must be reëducated at the same time in order that the entire muscular system may be put in proper functioning order; that is a biological necessity.

I agree with the following on the judgment of mental status: "The judgment of mental status of the cerebral spastic child is singularly difficult. The patients are almost always restricted to a very narrow life, and speech difficulties are usually marked. No doubt many crippled children are judged too severely and regarded improperly as idiots or imbeciles. The combination of set expression and speech defect with extreme awkwardness creates an impression of defective mentality that is hard to overcome." (Crothers, in *Medical Clinics of North America*.<sup>8</sup>)

The mental training of crippled children is attracting more and more attention, and surely the faculty of speech, one of the most essential, personal and intimate avenues of expression, deserves to be kept alive, to be strengthened and put in working order in these handicapped children. This work is a very recent development and has received very little attention from specialists.<sup>1</sup> Scripture devotes one (1) page to it and calls it "spastic speech" but suggests no treatment. Bluemel<sup>7</sup> mentions it.

## ORTHOPAEDIC HOSPITAL-SCHOOL PATIENTS WITH SPEECH DEFECTS.

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Total number of cases examined.....	1020
Number of patients with speech defects.....	82
Number of patients with no diagnosis of speech defect.....	15
Total .....	97

Name	Age Entered	Present Age	Age Examined	Psych. Age	I-Q	Diagnosis	Part Affected
A. F.	2-11	4-10	3-3	2-		Spastic Diplegia	Legs and Right Arm
A. S.	2-6	3-8	2-	-11		Spastic Paraplegia	Legs
A. C.	12-	12-7	12-	6-8	55	Spastic Paraplegia	Legs
A. T.	6-9	7-5	6-10	3-2	46	Spastic Hemiplegia	Right Side
B. C.	10-9	12-7	10-9	8-2	Ret.	Infantile Paralysis	Left Leg
A. H.	7-6	9-8	7-6	8-	Br.N.	Infantile Paralysis	Left Arm
B. J.	2-10	3-3				Tubercular Humerus	Right
B. M.	2-1	3-6	3-2	3-2	100	Spastic Hemiplegia	Right Side
B. A.	9-2	10-3	9-4	4-4	46	Ataxia	Legs
					Sub.		
B. K.	4-3	5-4				Micro-cephalic	Entire Body
						Ant. Dislocation H ps	
B. E.	8-1	8-11	8-3	2-8	H.Sub.	Relaxed Posture	Posture
					(Mongoloid)	Endocrine	
						Subnormal	
C. V.	3-3	3-7				Spastic Diplegia	Legs and Right Arm
C. M.	7-5	8-10	8-6	4-2	50	Muscular Incoordination	All Extremities
C. J.	4-4	7-5	5-3	3-3		Jacksonian Epilepsy	Body
C. G.	3-	7-3				Birth Palsy Spastic	Right Side
C. V.	12-	13-4				Spastic Diplegia	All Extremities
C. W.	4-	5-5				Muscular Incoordination	All Extremities
D. F.	7-4	10-5				Cerebral Palsy	All Extremities
						Incoordination	
D. P.	19-7	20-	19-	11-11		Spastic Monoplegia	Left Arm
				H. Sub.			
D. F.	4-9	5-2				Spastic Paraplegia	Legs
D. T.	4-6	7-8				Spastic Diplegia	All Extremities
D. K.	5-8	6-5				Facial Paralysis	Right
E. F.	12-	14-2	12-	9-2		Prog. Muscular Atrophy	Back and Extrem.
F. E.	12-	15-2	12-7	10-		Spastic Hemiplegia	Left Side
G. A.	8-1	10-8	8-3	6-4		Friedrich's Ataxia	Legs
G. S.	11-10	13-5	11-10	12-4	Br. N.	Infantile Paralysis	Left Leg
G. S.	6-3	8-9				Spastic Paraplegia	Legs
G. M.	9-	12-5	11-10	8-10	74	Pseudo-Hypertrophy	Legs and Arms
G. R.	5-2	7-1	6-9	6-4	93	Spastic Hemiplegia	Right Side
G. M.	7-6	7-10	8-7	7-2	81	Muscular Incoordination	Legs and Arms
H. L.	7-	10-				Paralysis from Spinal Meningitis	All Extremities
H. M.	5-	6-	6-	4-10	Ret.	Spastic Monoplegia	Right Leg
H. E.	10-	13-1	10-	6-4		Friedrich's Ataxia	Legs
H. T.	12-	15-1	12-1	10-		Friedrich's Ataxia	Legs
H. M.	9-	10-5				Relaxed Posture	Posture
I. B.	9-	9-6	9-	9-6	100	Incoordination	
I. H.	8-11	10-2	8-9	7-3	Ret.	Tubercular Knee	Right
J. S.	15-10	16-8	15-10	7-8	48	Ankylosis Hip after	Right
					H. Sub.	Old Septic Arthritis	
J. H.	13-7	15-6	(Mental Defective)			Scoliosis	Back
						Mentally defective	
K. L.	3-9	5-6	4-10	4-	83	Spastic Paraplegia	Legs
					Ret.		
K. M.	11-5	12-6	11-5	6-4	63	Scoliosis Spastic Monoplegia	Back and Right Leg
						Mentally defective	
K. L.	18-	23-				Muscular Incoordination	
K. R.	4-	4-4	4-	2-4	60	Spastic Paraplegia	Legs
K. F.	3-6	5-5			Idiot	Mongolian Idiot	
K. O.	7-	9-			Idiot	Cervical Kyphosis	Neck
						Mongolian Idiot	
K. R.	12-	15-4				Spastic Paraplegia	Legs
M.	2-8	3-3				Spastic Hemiplegia	Right Side
M. M.	11-9	12-	11-10	9-10	84	Spastic Diplegia	All Extremities
M. D.	14-	17-				Scoliosis Flat Feet	Back, Feet
M. R.	5-	7-8				Spastic Hemiplegia	Right Side
M. F.	14-	17-3	15-	8-1		Spastic Hemiplegia	Right Side
M. M.	9-3	9-4				Bilat. Syndactylism hands	Hands
M. D.	7-6	9-	7-6	5-		Spastic Diplegia	Right Arm and Legs
N. L.	9-4	9-10	8-6	-11		Spastic Diplegia	All Extremities
P. B.	8-	12-4				Infantile Paralysis	Right Leg
							Left Side Face
R. J.	3-1	3-4				Spastic Diplegia	All Extremities
R. P.	15-	18-7				Spastic Hemiplegia	Right Side
R. G.	11-9	13-1	11-9	5-1		Scoliosis Subnormal	Back

Name	Age Entered	Present Age	Age Examined	Psych. Age	I-Q	Diagnosis	Part Affected
R. B.	3- 1	5- 4				Spastic Paraplegia Incoordination	Legs
R. H.	7-11	8- 6	8-	4- 4	55	Relaxed Posture	Posture
S. A.	13-	15- 6	14-	7- 2		Spastic Paraplegia	Legs
S. N.	11- 7	13-10				Scoliosis Flat Feet	Back, Feet
						Mentally backward	
S. J.	13-	14- 9				Spastic Diplegia	All Extremities
S. J.	2-	2- 6	2- 1	1- 8		Spastic Diplegia	All Extremities
S. S.	13- 2	13-11	13- 3	11-	83	Kypho-scoliosis	Back and Feet
						Flat feet	
S. C.	15- 4	16- 3	15- 4	6- 6	H. Sub.	Spastic Diplegia	All Extremities
S. D.	9- 8	10- 8	9- 8	5- 8	58	Muscular Incoordination	All Extremities
					Sub.		
S. W.	13- 9	15- 8	13- 9	4- 2	H. Sub.	Relaxed Posture	
						Jacksonian Epilepsy	
						Mentally subnormal	
S. R.	13-	14- 3	13-	11- 4	Ret.	Spastic Diplegia	All Extremities
T. T.	15-	17- 1				Spastic Diplegia	
T. R.	15-	19- 3	17- 8	12-	Ret.	Spastic Demiplegia	Left Side
V.R. F.	16- 5	16-10	16- 5	9- 6	58	Muscular Incoordination	All Extremities
V.W. L.	3- 1	3- 3	4-	1- 4		Muscular Incoordination	Legs
V. E.	15- 3	15- 9	15- 3	6-	Sub.	Spastic Diplegia	All Extremities
W. G.	3-	3- 6	3- 6	2-10		Spastic Diplegia	All Extremities
W. C.	4-	7- 4				Spastic Diplegia	Left and Right Arm
W. R.	4- 7	4- 8	4- 8	4- 4	93	Muscular Incoordination	All Extremities
S. W.	14- 6	14- 8			Adult	Rigid total round back	
A. W.	13- 3	13- 4			38	Incoordination	
F. W.	15- 2	15- 3			66	Spastic paralysis	
E. K.	15- 8	15- 9			62	Spastic paraplegia	
M. R.	13- 1						

On a recent visit to the cities of New York, Philadelphia and Boston I asked many orthopaedic surgeons and speech defect specialists whether they were doing anything for the language ability of their orthopaedic patients, and in most cases received the answer, "No, I never thought they could be benefited." It was not till I reached the University of Iowa in my search that I was rewarded by finding a speech clinic with an orthopaedic surgeon who was alive to the necessity for speech training in crippled children and keen to hear what was being done here in Los Angeles.

Speech training alone as a biological necessity in the utilization of muscular coordination to express emotion, does some definite things for crippled children. First, it correlates muscular activity with mental images in the expression of emotion; Second, develops association paths in the brain; Third, develops more breathing power, more oxygen, better circulation, better voice; Fourth, increases inhibition of purposeless, energy-wasting muscular movement; Fifth, develops motor-mindedness; Sixth, strengthens and coordinates muscles of the tongue, lips, throat and cheeks; assists in the cure of drooling.

It is evident that only oral expression can be developed in a spastic, especially in right-handed cases. The attempt to hold a pencil or chalk so intensifies the spasticity that the effort results in breaking the pencil point or chalk, or in dropping it from the hypercontracted fingers. Small muscle movements are not attempted in the reeducation of a spastic child; only gross movements, slow and rhythmic,

often with music or the metronome, and at first not purposeful, are used.

Goddard, in his "Psychology of the Normal and Abnormal," makes the statement that the pattern for action resides in the neurons and that the patterns are hereditary or acquired. Hereditary patterns must result from a persistence of impressions transmitted from parent to child. Granted that the crippled child is normal mentally, that is, he has a normal amount and distribution of brain cells, then he has normal hereditary *neuron patterns*. If the proper stimulus is applied, these neuron patterns can be awakened and normal responses evoked; hence training in muscular coordinations, gymnastics, physiotherapy, speech-drill, etc., can reasonably be expected to produce more activity of brain cells, more mental development, because all functions of the nervous system are facilitated by repetition (Herrick). The exception to this would be those cases of paralysis resulting from meningitis or infantile palsy where the disease has resulted in the actual loss of neurons.

Through the working of that principle in neurology as well as in physics known as the "Summation of Stimuli," a term used to express the fact that a nerve path once having been used, the nerve energy once passed over a certain line of neurons, those neurons are somehow modified or changed by that passage and the effect is permanent; it is never entirely lost. When a second stimulus comes, it not only passes over *that line* somewhat more easily because the pathway has been used before, but the effect is added to the previous effect and that path becomes the favored path (Goddard).

Then by association fibers any brain center may be stimulated. These facts are some of those at the bottom of the training of crippled children through speech-drill combined with gymnastics and physiotherapy.

The work is only in its early stages and this is a report only meant to show by the enormous percentage of cases requiring speech training, the practical place for a department for speech development in every orthopædic hospital.

Our progress is slow, but our results have been very satisfactory. We can definitely assert that speech reëducation has a definite place in the training of crippled children because, combined with physiological rest of the affected parts, and with physiotherapy, it does five things. First, it saves energy; Second, allows the development of coördination; Third, it improves nutrition; Fourth, develops mental ability, and Fifth, it increases inhibition, thereby increasing the saving of nervous energy.

In collaboration with members of the Orthopædic Hospital-School of Los Angeles, I have put into practice the following plan for the development of normal speech in spastic and other orthopædic cases.

The Director of Physical Education, Miss Sue Roen, and I, have found that our treatments overlap and that the more closely we co-operate the better the results obtained. The exercises given below have been found in practice to meet the requirements. In the great majority of cases modifications are necessary to suit the individual.

#### EXERCISES FOR SPEECH DEVELOPMENT IN SPASTICS, MOTOR PARALYSIS FOLLOWING INFANTILE PARALYSIS, MUSCULAR INCOÖRDINATIONS AND ATAXIAS.

1st, Absolute quiet and alone with patient.

2nd, Relaxing Phase.

- A. Metronome counting.
- B. Music—instrumental or vocal.
- C. Sing-song rhyme.
- D. Relaxing massage (stroking tense muscles).
- E. Tepid bath.
- F. Breathing.

3rd, All movements slow and rhythmical.

4th, Extension work only.

- A. With assistance if needed.
- B. Against resistance.

5th, All gross movements (mass movements).

Gradually work toward finer movements. Tensing weak groups and relaxing contracted groups alternately.

- A. Muscle movement for arm—out—away—up.
- B. Muscle movement for leg—out—away—back.

C. Muscle movement for trunk—balancing between upright supports. Walking with feet separated (straddle gait) and kept apart by upright board. In subnormal cases the inclined board is used.

Side flexion, lying prone—which takes in head work, back and leg work.

NOTE: Swimming as a whale or hippopotamus and coming up to blow will answer the requirements in the hyperextension work and it includes arm, head, back and breathing exercises.

It is essential to make a game or play out of the work.

In a subsequent article supplementary to this one I will give in detail the drill in breathing with and without the limb movements, and the phonetic drills and vowel practice I have found to meet the requirements in these cases.

#### RESULTS AND CONCLUSIONS.

Owing to lack of trained assistants the speech development has been tried in only a few cases, but the results justify the conclusion that definite progress has been made. Two (2) boys, eight (8) and ten (10) years respectively, who could not tell one letter or sound from another or read the simplest words of one syllable or perform tasks in simple numbers, have learned to read and figure. They now read silently and aloud simple stories and poems. Two (2) cases of stammering have been arrested and two (2) cases of lisping, the "oral inactivity" of Dr. Blanton, have been corrected. In addition the language ability of five (5) has been improved and two (2) cases of motor paralysis, following epidemic poliomyelitis, have made progress in speech.

Drooling has ceased almost entirely in every case in which speech drill, muscle training, physiotherapy and other orthopædic treatment has been instituted.

The mental development, language ability, walking, eating, drinking and playing of all our spastic cases have improved so greatly under this form of treatment that we are obliged to conclude that the pessimistic attitude of many observers relative to mental training of crippled children must undergo considerable modification in the light of our achievements.

The mental tests were made by Mrs. Trippet, the Clinical Psychologist.

Thanks are due to Dr. Charles L. Lowmar for helpful suggestions, and to my wife for assistance in training.

#### SUMMARY.

Spastics .....	39
Incoördinations .....	10
Faulty Posture .....	7

Ataxias .....	6
Infantile Palsy .....	5
Subnormal .....	3
Facial Palsy .....	1
Tubercular knee .....	2
Epileptic .....	2
Pseudo-hypertrophy .....	1
Progressive muscular atrophy.....	1
Miscellaneous .....	5

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- <sup>7</sup> Blumel: Stammering and Cognate Defects of Speech, 1913.
- <sup>8</sup> Crothers: Medical Clinics of North America, 1921.
- <sup>9</sup> Scripture: Stuttering and Lispering, p. 49, 1917.
- <sup>10</sup> Watson, John B.: Behavior, 1914.

## DISCUSSION OF DR. STIVERS' PAPER.

Before the discussion Dr. Stivers showed six cases; three, of Friedrich's ataxia; two, of spastic palsy; one, of muscular incoördination, all exhibiting marked defects of voice and speech.

Discussion opened by Dr. Charles L. Lowman (he said in part): I should like to express my appreciation and approval of Dr. Stivers' paper and emphasize one or two points.

First, we have noted that the training of the speech mechanism undoubtedly aids in other aspects of the psycho-motor development in our work with legs and arms, especially the latter, as the arms and hands are used in gesture and in place of and with speech under impulses which are racially old and thus more easily obtained than some of the other movements.

Second, as surgeons we have been too prone to think of the muscles as so many cords fastened to bones to be pulled this way or that and to be handled with impunity, surgically. We must begin to recognize that muscles are actually part of the brain mechanism in that they are the instruments of expression for the mind.

The training in these spastic cases requires an analysis of the mental and physical faults and the appreciation of normal and necessary sequence such as the doctor has mentioned in relating speech movements and body or arm movements.

I wish to heartily endorse the statements he has made and congratulate him on this very able presentation.

DR. F. L. ROGERS of Long Beach: Dr. Stivers has contributed a very helpful paper. He is doing real constructive work with these handicapped children who are being fitted to take their places in the world. His altruism in insisting on the recognition of the rights of the

crippled child will evoke an enthusiastic response in the heart of every right-minded physician. His plea for a special recognition of their peculiar mental status is in the line of constructive medicine. His work with defective speech is making it possible for these children to emerge from the "shut-in" to their rightful position.

DR. AMES of Los Angeles: It is a very important subject dealt with by Dr. Stivers, with a fine regard for the social aspects of these cases. The problem is to keep the institutions of the country from being overcrowded by supposedly mentally deficient children, and the work of Dr. Stivers will bring to the attention of physicians and educators the importance of differentiation between the crippled, speech defective child and the mentally deficient, crippled child. It is an original and praiseworthy work on Dr. Stivers' part and he deserves our thanks for calling our attention to it. How soon after beginning speech treatment does he notice any psychological effect on the child?

DR. INGRAM (Neurologist): The paper is a demonstration of the practical importance of the value of special motor and speech training in a large group of neurologic cases. Rehabilitation and the keeping alive of muscular function after various organic nervous diseases, is a most useful thing to have patients offered them. There should be a correct diagnosis made in every case as to whether any form of aphasia exists.

MISS CHAPIN (Supervisor of Speech Training, Los Angeles Public Schools): I wish that every teacher in Los Angeles could have heard this valuable paper. Dr. Stivers is doing a wonderful work in the building up of the speech of handicapped children. We who are doing the speech corrective work in the public schools realize the importance of enlisting the help of physicians everywhere to take more interest in these cases.

DR. DON P. FLAGG (Psychologist and Neuropsychiatrist): When we remember that in 1917 there were two hundred thousand (200,000) stuttering children in the schools of the United States this is surely getting to be a big economic problem. It has been well said by a neurologist of Columbia University that every teacher and parent should be taught the fact that normal speech and normal breathing are the foundation of a normal mind. Aside from the crippled children, I believe the psychology of the speech cases shows a fear of failure.

DR. STIVERS (in closing): The keynote to the solution of the problem of crippled children and mentally deficient children will be found in better race control, better birth control, better eugenics, better obstetrics, pedi-