Corrective speech with a study of two type cases

Sara M. Stinchfield

State University of Iowa

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CORRECTIVE SPEECH

WITH A STUDY OF TWO TYPE CASES.

BY

Sara M. Stinchfield, A. B.

A Thesis

submitted to the

Graduate Faculty of the State University of Iowa,

In partial fulfillment of the requirements

for the

Degree of Master of Arts

in the

Iowa Child Welfare Research Station,

Iowa City, Iowa,

1919.

December.
The writer wishes to express her appreciation of the suggestions and constructive criticisms offered by Dr. Bird T. Baldwin and Dean C. E. Seashore, during the preparation of this paper. Acknowledgement is also due to Dr. Amy Daniels and Miss Lora Hadley, of the Iowa Child Welfare Research Station, for suggestions and reports upon the type cases discussed herein.
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INTRODUCTION.

From about the sixth month onward to the end of the third year the child is making greater progress in the acquiring and perfecting of a technique of speech than at any other time in his existence. The quality of his environment and training in these early years is, therefore, of special significance in the investigation of speech development.

Near the end of the first year, while yet unable to interpret the meaning of many words, the infant understands their purport through his observation of persons about him. The recognition of familiar words enable him to interpret phrases. Finding himself enable to formulate the words which he hears, he initiates a period of imitation which includes the reproduction of familiar sounds made by moving objects, animals or persons. From a chance utterance of sounds containing vowels and consonants, he endeavors to produce words through the repetition of syllables, in imitation of the multi-syllabic words of adults.

After monosyllables and a few words of one syllable have been acquired, most children enter upon a babbling period which for a time seems to bear no resemblance to normal speech. This stage appears to be a further development of imitative speech, when instead of reproducing isolated words, the child is making his
first attempts at conversation, spontaneously uttering the changes of pitch and inflection which he hears in adult discourse. His experience in the world has already taught him that language is the means by which human beings make themselves understood, and secure a fulfillment of their wishes. Out of this chattering of meaningless sounds there at length emerges a vocabulary.

The plasticity of the child during this period leads him to discard outgrown verbal concepts as his control of the speech mechanism develops. Having learned that words, rather than signs, are the means through which he may secure the satisfaction of his wants, he attempts the spoken symbols which are to aid him in making his wishes known. Imitation leads to a preference for the form of speech which is most frequently heard and repeated. The importance of a good speech model during this formative period is evident.

Between the fifth and sixth years, or by the time he enters school, his speech should have normally progressed to the extent that he has largely outgrown early infantile speech concepts which led to erroneous articulation. When infantile speech (baby talk) or indistinct, poorly articulated speech persists into the fifth year, one may reasonably expect to find a speech impediment which is responsible for the delay. It may be, however, that childhood illnesses have retarded his growth and development affecting also his
speech. One cause alone may be operative, or there may be a combination of several factors organic and functional, of which the speech disturbance is only a symptom.

Disturbances of the speech mechanism due to physical defect, are classed as organic in nature, and include malformations, cleft palate, elongated uvula, paralysis, defects of the vocal cords, enlarged glands, disease or defect of the ears, nasal obstructions or deflections, atrophied muscles of the tongue, larynx, lips or uvula.

In another group are classified cases where no defects of structure are apparent upon physical examination, but in which there exists an interference with the natural action of the speech mechanism. Among the primary functional disturbances are poor auditory imagery, low mentality, emotional instability, habits, and neurotic disturbances. It is more difficult to isolate the speech defects of a functional nature, since in certain types there is no distinct demarkation.
PART I.

AN ANALYSIS OF THE SPEECH OF CHILDREN IN
THE FIRST SIX GRADES OF THE UNIVERSITY OBSERVATIONAL SCHOOL.

In order to discover prevailing standards of speech and existing speech defects, and to formulate methods for the correction of the latter, the Iowa Child Welfare Research Station made an investigation of a typical group of one hundred and thirteen children, enrolled in the first six grades of the University Observational school.

The method employed was: first, scientific testing to discover individual speech disorders; second, cooperation with the teacher and with the home in removing the cause through proper medical or orthodontic treatment, followed by speech training for correction of the speech difficulties; third, immediate training for minor faults of speech and correction of common errors.

The total number of children examined was one hundred and thirteen. Of these, forty-five cases were classified as having organic speech defects, fifteen cases were classified as presenting functional speech disturbances, and in ninety-three cases common errors or minor speech difficulties due to negligent habits of speech or imperfect articulation were discovered, the latter indicating the prevalence of common irradicable errors.
I. The specific disorders, with number of cases occurring under each were:

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<td>45</td>
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<td>Tone monotony</td>
<td>86</td>
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<td>Inaudibility</td>
<td>21</td>
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<tr>
<td>Harshness</td>
<td>7</td>
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<tr>
<td>Nasality</td>
<td>18</td>
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<tr>
<td>Slurred syllables</td>
<td>39</td>
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<td>Poor enunciation</td>
<td>75</td>
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<tr>
<td>Sluggish speech</td>
<td>21</td>
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<td>Throaty tones</td>
<td>3</td>
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<tr>
<td>Marked mispronunciation</td>
<td>26</td>
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<tr>
<td>Faulty respiration</td>
<td>15</td>
</tr>
<tr>
<td>Nervousness manifested in speech</td>
<td>5</td>
</tr>
<tr>
<td>Repetition of syllables</td>
<td>4</td>
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</table>

II. The most frequent habits of negligent speech were:

- Initial, middle or final letters slighted.
- Dropping of syllables.
- Inaccurate nasal sounds.
- Inaccurate prefixes and diphthongs.
- Inaccurate vowel sounds.
- Difficult consonant combinations.
- Substitution of one letter for another.

III. The most frequent errors in articulation were:

- Omission of the vowel o, in 75 cases.
- Final letters slighted:
  - d " 92 "
  - g "181 "
  - l " 102 "
  - p " 70 "
  - t " 91 "

- Consonant combinations—ble, 61 cases.
  - ple, 60 "
  - tle, 31 "
  - shr, 30 "
  - sh, 24 "
  - spl, 22 "
  - spr, 18 "
TABLE I.

Speech Development of the Normal Child

I General Classification

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<tr>
<th>Grade</th>
<th>I Organic Origin</th>
<th>II Functional Origin</th>
<th>III Negligent Speech Habits</th>
<th>Number of pupils in grade</th>
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<tbody>
<tr>
<td></td>
<td>Dentition; Malformation; Effect of disease</td>
<td>Hysteresis Aphonia or other affection of the nervous system.</td>
<td>Inaccuracy Slurring speech Mispronunciation Carelessness in articulation.</td>
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### III COMMON DEFECTS.

1. Omissions, or slighted sounds.

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<th>(c) Initial letters</th>
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<th>(d) Middle Letters</th>
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2. Consonant Combinations

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# Table III

## III. COMMON DEFECTS

### 2. Consonant Combinations (cont)

| Grade | adv | ble | br | ch | ck | cl | cr | ct | dle | dr | es | ex | fl | fr | gl | ing | kle | ld | lk | mpt | nk | pl | ple | pt |
|-------|-----|-----|----|----|----|----|----|----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| v     | 1   | 0  | 1  | 0  | 4  | 1  | 0  | 0  | 0  | 2  | 2  | 5  | 0  | 3  | 13 | 1 |
| vi    | 5   | 20 | .12| 3  | 0  | 4  | 1  | 2  | 0  | 1  | 7  | 1  | 0  | 1  | 0  | 9  | 0  | 3  | 2  | 21 | 2 |
| total | 1   | 12 | 61 | 1  | 15 | 1  | 8  | 3  | 1  | 17 | 1  | 2  | 3  | 6  | 12 | 7  | 14 | 11 | 60 | 7 |

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### III. COMMON DEFECTS

#### 3. Substitutions

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<td>1</td>
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<td>TOTAL</td>
<td>58</td>
<td>3</td>
<td>18</td>
<td>3</td>
<td>2</td>
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<td>1</td>
<td>56</td>
<td>2</td>
<td>9</td>
<td>3</td>
<td>2</td>
<td>113</td>
</tr>
</tbody>
</table>

| Number in Grade | 12  | 16  | 19  | 16  | 25  | 16  | 23  |

Table III.
The results showed that 88% required speech drill in the enunciation of sounds and corrective exercises for slight faults of negligent speech. Of the remainder 40% were in need of medical or dental treatment before speech could be properly begun, and 13% were found to be in need of individual attention for speech difficulties arising from nervousness, hypersensitivity or fright.

From these groups 25 children were selected for special class training in speech, under supervision of the writer, during the school year from October to March, 1918-1919, and during the ensuing school year (1919-1920) speech training of all children in the elementary school, has been given once each week by Miss Helene Blattner.

Tables I, II and III, give results in detail.

Tests on Grade I, shown in Table III, were unsatisfactory, owing to children's inability to read the test words, and their tendency to reproduce the words accurately, if pronounced for them. The material available for testing, was not sufficient to enable the writer to secure the child's own spontaneous enunciation of all of the test words. Further speech tests for first grade children, covering the required range of consonant sounds and consonant combinations, are needed. The speech should be spontaneous and not a result of the imitation of the enunciation of the experimenter.

The numerals represent the number of children in each grade coming under the various headings. There is a frequent overlapping, as more than one type of error may be found in a given case.
PART II.

ANALYSIS INTO SYMPTOMS AND CAUSES.

From examination of approximately five hundred cases, the writer has found that speech defects may be viewed from the standpoint of symptoms and causes, in the following relationship.

<table>
<thead>
<tr>
<th>SYMPTOMS</th>
<th>CAUSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Faulty respiration due to</td>
<td>a. Poor posture.</td>
</tr>
<tr>
<td></td>
<td>b. Adenoids.</td>
</tr>
<tr>
<td></td>
<td>c. Hypertrophied tonsils.</td>
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<tr>
<td></td>
<td>d. Hypertrophied thyroid glands.</td>
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<td></td>
<td>e. Nervousness.</td>
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<td></td>
<td>f. Physical debility.</td>
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<tr>
<td></td>
<td>g. Shallow breathing.</td>
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<tr>
<td>B. Defective articulation due to organic defect.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. Defective hearing.</td>
</tr>
<tr>
<td></td>
<td>c. Sluggish mentality.</td>
</tr>
<tr>
<td></td>
<td>b. Adenoids.</td>
</tr>
<tr>
<td></td>
<td>c. Hypertrophied tonsils.</td>
</tr>
<tr>
<td></td>
<td>d. Malnutrition.</td>
</tr>
<tr>
<td></td>
<td>b. Lesion affecting the speech centers.</td>
</tr>
<tr>
<td></td>
<td>c. Childhood illnesses.</td>
</tr>
<tr>
<td>C. Defective articulation due to functional disturbance.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. Hysteria.</td>
</tr>
<tr>
<td></td>
<td>b. Inaccurate tongue position.</td>
</tr>
<tr>
<td></td>
<td>c. Imitation.</td>
</tr>
</tbody>
</table>
7. Stuttering.
   a. Emotional instability.
   b. Hysteria.
   c. Chorea.
   d. Malnutrition.

8. Lolling; babbling; echolalia.
   a. Mental deficiency.
   b. Infantile speech habits.

D. Vocal defect; either functional or organic.

   a. Cleft palate.
   b. Adenoid growths.
   c. Deflected septum.

10. Hoarseness; harshness.
    a. Defect of vocal cord.
    b. Local inflammation.

11. Throatiness.
    a. Elongated uvula.
    b. Thick tongue.
    c. Hypertrophied tonsils.

12. Non-sibilant or high-pitched voice.
    a. Shallow breathing.
    b. Defect of vocal cords.
    c. Catarrh.
    d. Tuberculosis.

13. Loss of voice.
    a. Childhood illnesses.

14. Defects of voice due to paralysis.
    (lips, tongue, larynx, palate, bulbar palsy.)
    a. Congenital.
    b. Birth palsy.
    c. Illness.

15. Aphonia; absence of speech.
    a. Hysteria.
    b. Paralysis of vocal cords.
    c. Paralysis of nerves.
    d. Paralysis of laryngeal muscles.
    e. Tumor of larynx.
    f. Paranoia.
    g. Stubbornness and wilfulness.

16. Aphasia.
    Loss of power of expression by speech, writing or by signs.
    a. Lesions in motor areas of brain.
    b. Lesions in sensory areas of brain.
    c. Lesions in both areas of brain.
(A) Faulty Respiration—

The motor response to the speech impulse is both immediate and accurate under normal conditions. The muscles of tongue, lips uvula and larynx are brought under control by experimentation and practice, until the process of phonation in the young child through habit formation becomes automatic and effortless. By repetition the action of the vocal cords becomes an unconscious process, thru habit formation. It is when we have an interference with the normal action of the organs of speech that we find articulatory disturbances.

Speech defects are generally accompanied by faulty respiration. Shallow breathing, poor posture, strictures from tight clothing, weak lungs and physical debility may induce a departure from normal breathing. The diaphragmatic muscles may be inelastic and unresponsive because improperly exercised. In delayed, spasmodic utterances there are spasms of the diaphragm, and the individual often attempts to speak on an inspiration because he cannot properly control the muscles of the diaphragm for phonation during expiration. (39)

In normal breathing the diaphragm descends gently during inspiration, exerting a slight pressure upon the abdominal viscera, acting upon the costal cartilages and forcing the ribs
apart, so that the lungs may be completely aerated. During expiration the diaphragm reverts to its dome shaped appearance, assisting in the expulsion of air from the thoracic cavity. The concave upper surface of the diaphragm forms the roof of the abdomen. (10)

The motor breath force has been found to be inadequate in the cases of consumptives, anaemics, stutters, clutters and many persons whose speech and breathing are poorly coordinated.

Associated with respiratory difficulties are found nervousness, excitability, rapid pulse beat, throbbing arteries and irritable heart. The development of breathing control and the establishment of normal breathing is regarded by most authorities in the field of speech and song as the first point of attack for the correction of vocal defects.

Measurements of the upper and lower chest showing the amount of expansion possible when the chest is inflated, and comparison with the deflated chest are indications of vital capacity. If the clavicular type of breathing is predominant the expansion of the upper chest in inflation will be considerably greater and the expansion in the region of the diaphragm will be slight. When the diaphragm is active there is a pulling apart of the intercostal muscles, and an expansion of the lower ribs, with a noticeable outward pushing as the diaphragm descends. This is best shown in X-Ray studies, but one may observe his own method of breathing by standing before a mirror, with clothing removed from the waist.
upward, breathing as he habitually does, and then attempting to breathe more deeply. One may thus gain some idea of the relative activity of the diaphragm, and of the predominant type of breathing.

1. Marked mispronunciation.

Children who have developed speech in a normal fashion may be found to stumble over the words on the printed page. They may habitually speak with ease and fluency, and yet when they are obliged to concentrate upon the printed words, their speech becomes hesitant, slow and monotonous. The results of the Quantz Reading Tests indicate that children who read a great deal are the more rapid and expert readers. These tests show a correlation between mental alertness and concentration of attention. Lip movements appear to lower the reading rate, and the visual type is found to read more rapidly than the auditory type. We need to ascertain what percent of the auditory type have defective vision. The child, for example, who reads in a stumbling, inaccurate fashion, mispronouncing or miscalling words which he has seen many times before and which are a part of his own vocabulary may be suspected of defective vision. Halting speech, mechanical reading and plodding, dull tones may be by-products of eye-strain. When there are evidences that such is the case, one should speedily have the child's eyes examined by a specialist.

2. Sluggishness.

When speech is slow, halting and labored, it is an indica-
tion of physical debility. Sluggish speech may appear after a long illness, when the physical exhaustion has devitalized the organism to such an extent that the vocal organs are affected by the general weakness. The individual tends to regain the elasticity and normal action of the vocal mechanism as his strength returns, unless these are locally affected by the disease.

Sluggish speech in normal children of school age may be due to physical debility, malnutrition, or obstructions within the naso-pharynx. Children with adenoid vegetations or hypertrophic ed tonsils react sluggishly, are mouth breathers and show dull, passive expression, pale and anaemic appearance. Such children, when given the proper medical attention, often become alert, energetic and bright eyed, with quickened reaction time. These conditions affect the health of the child, impede his growth, and require the care of a physician.

Reticent children, reared without playmates, may manifest slow, halting speech due to embarrassment and lack of vocabulary, in the presence of strangers.

Sluggish speech is characteristic of Cretins and certain other types of mentally deficient children. In Cretinism the speech may be delayed until the fifth year or later. It may never appear. The speech is made up of inarticulate sounds, which are loud, coarse, slurring and cumbersome. There is a labored
clumsiness in movement, a slothful, apathetic facial expression, and general impairment of the mental faculties.

3. Mutism

The primary sources of mutism are congenital or acquired deafness, and diseases of the central nervous system. The former is generally referred to as deaf-mutism. The peripheral organs of speech and the speech centers may be impaired, the child remaining a mute because he is deprived of hearing, and, therefore, is not stimulated to imitate articulate speech sounds.

At birth two of the sense centers, the olfactory and gustatory are developed; touch and sight come next, and lastly hearing. (38) The hearing remains undeveloped for a period which varies from several hours to days or even weeks after birth, according to experimental evidence. Tests made by David Major (14) upon his child at twenty hours, indicated complete deafness. The test was repeated at twenty-seven hours and at forty-five hours after birth, and on both occasions, indications were that the tapping was not noticed. A test made on the third day by rapping a book sharply, with a folded newspaper at a distance of three feet from the child, was without effect. A small breakfast bell rung near the child's head on the fifth day was also without visible effect. Tests with bell and whistle on the seventh day brought no reflex. The first reflex came on the fourteenth day, when the child seemed to hear a small rattle when rapidly shaken.
Reactions were slight, however, indicating that the hearing was dull. On the nineteenth day there appeared a great advance in the acuteness of hearing. A small bell rung at a distance of ten feet from him, caused the child to stop nursing, hold his breath, and appear frightened. The bell rung again a few moments later caused him to stop nursing and begin to cry. The ears now seemed sensitive, as the bell was not rung loudly or long. The hearing appeared to become normally acute in the third week after birth. By the seventy-third day it was evident that the child was searching for the source of sound, but not until the one hundred and thirty-fifth day or middle of the fifth month, could he promptly determine the source.

Thought is more rapid than speech, and the individual gains a concept through certain words, not through every word in the sentence. The normal child has the advantage of perfect hearing to aid him in the building up of ideas. The deaf child must construct for himself certain words and ideas for which only the outline has been suggested through visual or kinaesthetic senses. The child whose hearing is within a range of from 64 to 2048 vibrations is rarely a mute. (Bezold)

The partially deaf child gains best results by using both eyes and ears in full cooperation. The eyes must be trained in accuracy, rapidity, retention, and ability to do their work automatically. (16) Being deaf only to certain tones, he can get others normally. Training in lip reading reduces the
nervous strain because the eye reads the sound which the ear cannot detect. As the average time per articulatory movement in ordinary speech varies from $\frac{1}{12}$ to $\frac{1}{30}$ of a second, it is evident that this rapidity is a difficulty in the way of successful lip reading.

The totally deaf child must substitute visual and kinaesthetic senses for auditory sense. The deaf person in the ordinary sense of the word, is the one who is deaf for those tones which correspond to the range of the human voice. Loud tones are useful in training deaf mutes since they are prescribed when the perception of ordinary tones is lacking. The differences in tones may be distinguished through tactual sensations.

A child born with normal hearing, who becomes deaf before entering school, tends to lose his speech, unless an effort is made to help him retain it. He has only commenced to associate with speaking people, and his speech education is in the initial stages. (31) Since the last acquired traits are the first to be lost, speech quickly deteriorates from lack of use.

When no auditory impression of sufficient intensity is conveyed by the auditory sense fibers to stimulate a motor response through the speech processes, the response will go out through other tracts in the form of gestures. The child finds by ex-
perience that he can imitate by using the muscles of the arms and legs, but, unless he can hear, he has no means of knowing that he can accurately imitate speech. Therefore, if deaf, he uses the surest means of communication, the sign language. Any deaf child allowed to remain undeveloped by instruction, tends to become wild, and ungovernable, and moral perceptions become blunted. What the child cannot hear, he cannot well understand, and as people about him act in a manner incomprehensible to him, he is perplexed, resentful and often angered. Unless he has developed reasonable-ness and understanding through language, his powers are much more limited than those of the normal hearing child, and his chances of happiness less than those of the normal children trained in lip reading and speech.

The hearing ability may be but slightly diminished, and yet sufficiently defective to cause incorrect auditory images. This leads to inaccurate reproduction and consequently to faulty speech. Deafness is usually not complete, a child being able to hear sounds either loud or of particular character, such as those made by the Galton whistle and tuning forks of sufficient intensity. He may hear vowel and consonant sounds in the human voice so indis-
tinctly as to be unable to imitate them unless trained to produce them by aid of the kinaesthetic sense.

(Tones sounded through the megaphone were sufficiently loud to stimulate imitative speech in the case of a deaf mute with whom the writer worked.)

Bezold found in Germany that the vowel "I" being high pitched, with over 1000 vibrations, and consonant "S" being high pitched, with about 2048 vibrations, are the two speech elements which seem to be most easily heard. Recent research in this country has tended to prove that tones in the neighborhood of 1000 vibrations most easily stimulate the ear.

Congenital deafness result from abnormalities of the internal ear of the auditory processes. This shows a great tendency to run in families.

The clipping of word endings and inaccurate pronunciation is often due to imperfect hearing. There is a possibility of feeble perception of sounds in children who present little or no history of ear trouble. They may be hard of hearing for certain sounds without being aware of the defect. Because the defect is slight, parents may be unaware of its existence, and are prone to attribute the child's reactions to carelessness or heedlessness. Sounds not clearly represented in the motor memory may be mispronounced. Words vaguely understood or entirely misinterpreted
may be due to weakness of the auditory center, with but slight deafness.

According to health reports from various institutions the deaf mute is more liable to pulmonary trouble than the normal child. Use of the air blast in speech is necessary, apparently, for the full development of the lungs.

Deaf children are more responsive to kinaesthetic sensations than normal children, it is claimed. (21) They notice sights and movements which are unobserved by the normal hearer. Unless education is begun early, however, the deaf child ceases the attempt to form syllables and begins to emit harsh, unpleasant sounds, grunts and screams. His other senses become more significant, his facial movements are exaggerated, his motions are quick and alert, and he employs a natural sign language. This differs from arbitrary signs used in the education of deaf mutes in various institutions, these latter having been developed by hearing persons to maintain a mental discipline for those to whom little or no speech is given.

Ravages of disease, fevers, laryngeal paralysis or lesions affecting the speech centers and central nervous system occasionally produce mutism. These are more properly discussed under childhood illnesses, paralysis and aphonia.
C. Cluttering and Nervousness.

Cluttering is characterized by excessive rapidity of utterance. The speech is hasty and given under excitement, so that it is indistinct, unresonant, and may be shrill or sharp, with little variety of pitch or inflection. In some cases the haste in speech is such that the child experiences both respiratory difficulty and faulty articulation, uttering scarcely intelligible speech. Certain syllables are omitted, perhaps; vowels are slighted and inaccurate and many consonants are slurred. The clutterer may be a child of superior mental endowments, from excellent environment, but his thoughts run ahead of his ability to express them, and in his eagerness to give utterance to his ideas, there is a confusion caused by the inability of the motor mechanism to keep pace with the speech impulse. Cluttering is not infrequent among normal children.

Clutterers are often neurotic, highly strung, sensitive or excitable children. Excessive speech rapidity may persist into adult life, not only does habit make the correction more difficult but the accompanying nervousness also yields less readily to treatment. (17)
Training for self control, tongue gymnastics, practice of clear cut, distinct, utterance are the best devices. The cooperation of the parents may sometimes be gained by calling attention to the fault, which is often due to imitation or other environmental factors. With training improvement comes quickly.

The excessive irritability of the nervous system is evident not only in the speech, but in the accompanying mental and physical unrest also. Such children should be carefully supervised as to rest, exercise, diet, study, and hygiene. The present condition of a child is not a safe index of capacity, as nervous children often improve most rapidly in a changed environment. Frequently they need to be taken from home and parents, and placed under trained supervision where their whims and vagaries will be subjected to wise discipline. The speech improvement of a nervous child is inseparable from physical and mental hygiene.

Disturbances of the intestinal tract, irritation of the gums, spasms, enuresis, somnambulism and chorea are significant in relation to speech. The fact that a child is precocious, docile or obstinate, cheerful or morose, forward or retiring should be ascertained, as in the one case the child may be overwrought, and overstimulated; (see type case II S) in the other he may be introspective, brooding, with melancholy tendencies, hypersensitive and unsocial, the speech defect appearing as a result of traumatic shock, fear, or ridicule of companions. (See Type Case I)
As a part of this paper, a report of two such varied types will be included, the stuttering in both cases being severe, but the nervous phenomena differs very markedly as to onset, course, and attendant features, yet both show certain common phases.

C. 5. Lisping.

A lisp is the substitution of an inaccurate sound for an accurate one. Three types of lisp are mentioned by Scripture (22) the organic (23) which is due to abnormal conditions of the speech organs; the negligent lisp (24) due to defective perception and execution of sounds, and the neurotic lisp (25) which is indistinct speech characterized by excessive nervous movements and tension.

In neurotic lisp so closely is the condition of tension and mental excitement allied to cluttering, that in many instances it is difficult to differentiate between them. In early childhood the inability to enunciate an s and z, due to missing teeth, is a purely temporary condition of infantile speech. In early childhood there is often a natural difficulty in making the contacts for the various letters. The majority of the authorities in the field of speech classify as lisp the substitution of other sounds for s, z, sh and zh sounds, as they occur in various combinations.

The term organic lisp seems best to describe the lisp caused by abnormal conditions such as a thickened tongue,
malocclusion, large inter-dental spaces, missing teeth or high palate, which prevent proper contacts being made by the tip or sides of the tongue.

The negligent lisp is generally a form of speech which results from defective perceptions of the correct sound, or results from habit continued because the child has failed to accustom the speech mechanism to making the correct contacts. It is sometimes due to tongue tie. Dr. Makuen (12) speaks of several cases in which the anterior fibers were too short, and he, therefore, divided the fibers of the genio-hyoglossus muscle. This results in improved speech.

Lisp ing caused by missing teeth tends to be corrected when the eruption of permanent teeth fills the spaces. Such lisp ing may persist, however, and training is important in order to insure the child's return to accurate enunciation when the organic difficulty no longer exists.

S and Z (18) which the Germans call the "rill sounds", are made with a central rill or depression extending from back to tip of tongue, the outer margins of the tongue being raised and coming in contact with the sides of the hard palate. The tip or rill portion is level with the closure between the teeth anteriorly. This is illustrated in the platograms shown by Scriptu-
When the entire tongue is raised and curved upward from side to side, without the central depression or rill, the sound is modified by the escape of breath over sides of the tongue instead of through the center depression. This produces the type of lisp which is most frequently found. Lisping is not infrequently due to paralysis of some of the muscles of the tongue. It is especially common among feeble minded children.

A lisp may be acquired by imitation of parent, brother or sister, or companions having this defect of speech. A susceptible, impressionable child will unconsciously adopt a lisp at first by imitation, but the danger lies in its becoming an habitual manner of speaking.


Enunciation has to do with fullness and distinctness of utterance. One may be able to utter the individual sounds of all consonants accurately, and yet slur or alter them when used in combination with other letters. Poor enunciation is characterized by indistinct initial, middle or final letters, dropping of syllables, unresonant nasal sounds, inaccurate prefixes and
diphthongs, inaccurate vowel sounds, indistinct consonant combinations, or substitutions of one letter for another, and is a result of negligent speech habits. (28)

C. 7. Stuttering. (1, 3,)

Stuttering is difficult, unrhythmical speech, characterized by spasmodic involvement of the oral mechanism. The nerve centers are surcharged with energy, and the oral mechanism lags behind the laryngeal, in the production of tone. This nervous surcharge is at times so great as to render the subject unable to phonate, the attack simulating momentary dumbness, or persisting occasionally for weeks at a time.

In the common variety of stuttering, phonation is delayed by the incoordination existing between the respiratory, laryngeal and oral muscles. A blocking of the nasal passages may impede respiration, or there may be shallow, clavicular breathing poorly coordinated with speech. Often the attempt to speak on inspiration is made, and the speech comes in spurts or spasms. Scripture considers faulty respiration to be the primary cause of stuttering, giving laryngeal faults as a secondary cause. The experience of the writer is in harmony with this view.

There often exists a congenital weakness of the speech muscles or organs, and there is a strong likelihood of acquired structural changes in the nervous system, after the onset of
stuttering. This form of speech disorder is almost invariably accompanied by spasmodophilia of those parts of the face supplied by the seventh nerve. The spasmodic movement or twitching, when prolonged, may extend to the respiratory and laryngeal muscles, as well as to the arms and other portions of the body. In cases of long standing, it requires a longer period to eradicate the tic, which has become a habit spasm. In adult cases it is seldom entirely eradicated.

After considerable training, lapses occur, and under unusual stress or emotion the stuttering habit is liable to reappear for a longer or shorter period. If training has been begun when the stutterer is still in an early stage, correct speech habits are more easily formed.

There exists some confusion regarding the application of the terms stammering and stuttering. The Germans differentiate very clearly between stammeln (mispronunciation) and stöttern (difficult speech); but so widely are these terms used interchangeably in English that the distinction has been lost. We, therefore, employ the term stuttering to include dyslalia, dysarthria or speech hesitation, ranging from the milder form which Worcester, Webster, Hammond and Butterfield designate as stammering, in which there is no repetition, to the more pronounced forms accompanied by repetition and spasmodophilia.
Stuttering to a slight extent seems to be common to all excitable children when learning to talk. It is noticeable that they articulate more clearly when made to speak slowly. Many children stutter only under the influence of haste, excitement, or strong emotion. This may be noticeable at two or three years of age, but tends to disappear as the speech function becomes established. Its most constant form is repetition of first consonants and first syllables. He may attempt to speak on inhalation which results in spasmodic, jerky utterances. P, b, t, d, k, g and m seem to be the consonants upon which children most frequently stutter. One rarely finds a stutterer who cannot sing and whisper without stuttering.

Experiences in childhood are often intimately related to stuttering. Among the significant factors are history of birth and development, nervous phenomena, spasms, teething, intestinal disturbances, somnambulism and conduct. The personality and habits of the child need to be carefully observed as outward manifestations of the mental characteristics and degree of physical vigor.

Stuttering frequently first appears during puberty, when the great physical changes are taking place. The course of physical development through the adolescent period may be
vitaly related to speech defect. One should know the child's attitude toward the other sex, his occupation, success in school or business, character and conduct, or unusual events in history.

Procedure in the case of speech defects as outlined for the Philadelphia Polyclinic Hospital consists of (a) proper management of the breath; (b) proper management of the organs of articulation; (c) proper development of the physical state of the patient; (d) careful study of the throat; (e) removal of pathological defects, adenoid tissue or diseased tonsils.

Emotional instability is closely related to stuttering. It is difficult to differentiate between normal and abnormal emotion, as the emotions even in health present characteristics closely allied to the pathological. Emotional deterioration is, however, one of the first striking symptoms of the onset of disease. In women and children it is prone to appear in the form of outbursts of anger or hysteria. This affects breathing, circulation, pulse, gland secretions, as well as accuracy of movement, clearness and intensity of sensations.

Persons with neurotic predispositions may, because of the weakened inhibition, suffer functional disturbances which will affect speech. The mal-adjustment of motor, respiratory and vibratory speech agents resulting in stuttering or other abnormal speech, are very frequently the symptoms of a neurosis.
The stronger emotions produce extensive disturbances of innervation, such as trembling, convulsive contractions of the diaphragm and of the facial muscles, and paralytic relaxation of the muscles. In children predisposed toward stuttering neurosis may be merely the outward sign of a serious functional disturbance, caused by excessive emotion.

Constitutional inheritance (6) produces certain well-known peculiarities in persons of morbid tendency. Introspection, hypersensitiveness and secretiveness often so isolate the individual from his kind that he exhibits unsocial tendencies and a moody, brooding temperament, even before signs of a neurosis are apparent. Being introspective, he is unresponsive, and dejected, and this is expressed in his posture, his drooping shoulders, flattened chest, protruding abdomen, lustreless eye and drawn, sad expression of countenance. Apprehensiveness is apparent in his actions toward those about him; he is shy, and lacking in initiative. A speech disturbance not infrequently appears as external evidence of inner morbidity.

In the neurotic child speech disturbance accentuates his sensitivity and seclusiveness. To build up will power (39) and confidence is the first step in restoring normal speech. Mental orthogenics must be practiced before sufficient confidence
will have been gained to secure the readjustment of the malfunctioning speech mechanism. The anti-social tendencies must be eliminated, the personality developed, and the child attracted to new external interests until he becomes less self-conscious and deprecatory. This requires a drawing out, or a stimulation of the interest in things impersonal, and outside himself.

Mosso (16) speaks of fear as influencing the entire mental and physical condition. This is certainly true for the stutterer, for the very fear lest he stumble, inhibits his speech and produces the very effect he wishes to avoid. Fear may become so intense in the case of very young children, as to amount to a phobia. A sex shock or severe fright has often produced a condition leading to stuttering or inability to phonate. The three sources of courage stated by Mosso, - nature, education and conviction, should be utilized in remedial treatment.

There is strong evidence that stuttering may be of a hereditary nature. It seems especially prone to appear in successive generations when there is a neuropathic history.

Various authorities state that stuttering is most liable to appear at periods of transition in growth, and during the great physical changes of puberty and adolescence. It may appear
with the first efforts to talk. It is then usually discarded as the speech develops. It is again prone to appear at second dentition, when there is a tendency toward nervous instability. With the onset of puberty, from twelve to fourteen, the period of functional disturbance and heightened self consciousness; at adolescence, from fourteen to eighteen, when there is defective nervous control attendant on the physical changes, there seems to be a tendency to develop stuttering habits.

Fatigue, peripheral irritation (worms), or shock may be the exciting cause. It sometimes appears as after effect of such diseases as scarlet fever, diphtheria or whooping cough.

Stuttering is found among mentally deficient persons, paralytics, and patients suffering from true aphasia (34). In such cases the prognosis is less favorable than in cases due to any of the foregoing causes.
Chorea.

Chorea is significant in relation to speech defects, because of the danger of persistence of cluttering, speech hesitation or stuttering, or jerky, irregular speech.

In mild chorea the speech is not usually greatly affected. It is characterized by slowness, irregularity or hesitancy in speech. In the severer forms, where the voluntary muscles become involved, the speech varies from a stuttering, explosive type, to mumbling and inability to speak at all. The speech disturbance may be due to irregularity of respiratory rhythm or spasm of the diaphragm. The mental symptoms commonly associated with this state are lack of concentration and memory.

A child is particularly susceptible during convalescence, and a mild infection may be sufficient to produce chorea. Fright, excessive mental strain or other strong emotion may be sufficient to produce an attack. Poynton, Holmes and Duckworth speak of chorea as a "cerebral rheumatism".

Sydenham's chorea or St. Vitus' Dance occurs chiefly in children, due to the effect of an infectious agent or toxin, (18). It is characterized by irregular, involuntary muscular contractions, associated with purposeless movements and psychic disturbances. According to Osler's statistics girls are more
frequently affected than boys, and in the ratio of two to one. (27) It is most frequent during the later years of childhood. Still (26) mentions as early symptoms the shoulder shrug, irregular gait, twitching of the corners of the mouth, monotonous speech and blurring of words, and a clucking sound made by suction of the tongue against the palate. One also finds spasms of the diaphragm, exaggerated knee jerk and irregularity in the heart rhythm. Its duration may be four to six weeks, or five to six months. It may even drag on for a year or more. The more violent attacks generally end more quickly. The disease is sometimes confused with hysteria or purposive simulation of chorea.

Huntington's Chorea is almost exclusively a disease of adult life. In Huntington's Chorea the entire body becomes affected. There are spasms of the facial muscles, the speech being affected by involvement of the tongue, lips and respiratory muscles, and developing a hesitant, explosive, stuttering type of articulation. (19, 4, )

C. 8. Lalling, Babbling, Echolalia.

In various grades of amentia are found individuals who reiterate a syllable or sound, or repeat a single word or phrase without reference to its meaning. This repetition of words or phrases is known as echolalia. Early infantile speech attempts are a form of echolalia, as for example, when a child repeats
the sounds made by adults or objects about him which are at first meaningless to him. In the mentally deficient child such speech tends to persist (30).

In such words as mamma, papa, tick-tick, the child gains his starting point for the acquirement of language. After gaining control of the speech mechanism for the production of a few simply syllables, the normal child gains a wider control of different sounds, until he is able to pronounce the new words as a unit. This requires a mental effort which appears to be lacking in various defective children, and the babbling persists as a form of defective speech, (8).

A form of speech known as lalling is often associated with stuttering. This is due to the want of precision in the action of the oral articulatory mechanism. In the normal child it is due to insufficient practice; in the imbecile, to want of intelligence necessary to educate the speech centers? Lalling, balling, grunting, echolalia, and words of their own invention are common to imbeciles. It is not unusual for normal children to invent a language of their own which may be unintelligible to those about them. It appears to be due to infantile speech habits which have not been sufficiently discouraged, or to retarded development. Blanton calls such speech idio glossia.

The writer has found several such cases among first grade children, twins, or children of the same family differing
in age, who have developed such speech among themselves. In
the case of a young woman recently examined, such speech had
persisted into the nineteenth year.

The stages of echolalia, babbling and invention, among
abnormal or mentally deficient children seem to correspond to the
gradations in the acquirement of speech by the normal child.
Mental deficiency is due to some alteration of the brain cells
which render the mind incapable of development, and these children
differ greatly in degree of mental deficiency. The lower grades
are with difficulty separated from the imbecile class, and the
higher grades are but very little removed from the retardates
among normal children.

Anatomical irregularities (7, 10), stigmata and speech
defects tend to occur more frequently in the mentally deficient
than in normal children. It is estimated that in about three
fourths of the cases there is defective speech (35).

The speech of the mentally deficient child varies from
an inability to pronounce numerous consonants, to unintelligible
speech of a babbling or lalling type. There is frequently a
misapplication of words, inability to recall, imperfect arrange-
ment of sentences or slurred, hesitating and indistinct speech.
Correct and distinct speech requires distinct mental effort.
Speech usually develops late in these cases. Sometimes a voc-
abulary of but few words is acquired in several years, and the
customary early babbling of babyhood may be absent. Idiots commonly have no speech at all. Imbeciles are able to understand and speak short sentences, but possess small vocabularies, and their articulation is usually defective.

In the moron the imperfections are less, and there is a more extensive vocabulary, but these children are usually incapable of constructing or understanding a complicated sentence. Tredgold states that there is a distinct relationship between the capacity for speech and the degree of mental defect. Esquirol based his classification of mental deficiency on speech ability. This is unwise, however, as the absence of speech may be due to some very different cause. In general it is safe to assume that where there is no deafness, and there is a marked speech defect with no organic disturbance to which it is traceable, mental deficiency exists.


Nasality.

Nasality due to cleft palate and hare lip, or to cleft palate alone, is one of the most common types of speech defect brought for clinical treatment. The cleft may extend back on one or both sides to the naso-pharynx; the whole palatal arch may be absent and the interior of the nose exposed to view from the oral side; it may be united in front, with bifid uvula and posterior cleft (41).
When the cleft extends through the lip, the condition is known as hare lip. Developmentally, it is due to the failure of the premaxillary process to fuse with the maxillary, while cleft palate is due to the failure of the two maxillary portions to unite during the prenatal period.

Owing to the shortness of the velum or to its absence in such cases, the patient is unable to shut off the opening into the naso-pharynx during the emission of oral consonants and vowel sounds, and an unpleasant nasal quality is imparted to these tones. The labial movements are generally weak, and if the cleft extends anteriorly to the alveolar process, the tongue is unable to make the proper contact with the hard palate, thus altering the lingual consonants. One usually finds such children to be mouth breathers, and though many of the muscular movements necessary for good speech require considerable attention, the development of the superior constrictor aids to a certain extent in stimulating the muscular movements of back of tongue for k and g sounds. Nasal and mutes are scarcely to be distinguished, in the speech of the usual cleft palate patient, p, b, and m are practically identical; t and d sound like n, and k and g sound like ng.

Correction by surgical methods is at the present time favored by the majority of writers on this subject. Results
of speech training in post operative cases appear to warrant the assumption that much more rapid progress toward normal speech is made, because of the use of the muscles involved, in operative cases, than in those where the obturator is employed. The time of operation should be determined by the condition of the child. Most surgeons favor operating within a few months after birth in order to prevent the formation of incorrect habits. Inaccurate speech habits, once begun, and continued for a period of years are increasingly difficult to overcome, and the prognosis in adult cases is generally unfavorable.

Nasality may be due to deflection of the nasal septum, which interferes with the reinforcement of tone by the resonance chambers of the head. The openings into the sinuses are more or less closed by the thickening process, thus diminishing the quality of tone.

Adenoid growths, blocking the naso-pharynx, interfere with the nasal resonance, respiration and quality of tone by altering the nasal passage and contour of the oral cavity, according to recent medical authorities. Such growths indirectly influence speech. Narrowness of the upper dental arch with consequent malocclusion may be traced to the presence of adenoid growths in infancy.
Hoarseness, harshness.

Chronic pharyngitis or "clergyman's sore throat" is one of the most common types of huskiness or hoarseness. The muscles of the pharynx become constricted in movements, inflamed and uncomfortable, modifying the vocal resonance. This is due to extreme fatigue, long continued use of the voice under abnormal conditions, or to misuse of voice. In the severer forms, hoarseness may be a sign of laryngeal tuberculosis or cancer of the throat. Recurrent or persistent hoarseness is sufficient evidence of abnormal conditions to warrant medical examination.

The hoarseness and harshness of voice attendant upon the changes of puberty, and through the early period of adolescence, is a natural condition, due to the physical changes taking place in the larynx. The change is slight and scarcely noticeable in the case of the growing girl, but with the boy the alteration in voice and quality of tone may be so marked as to cause considerable concern and embarrassment. The boy's attention should not be directed to his speech at this time, unless stuttering or grave symptoms appear.
Climate is believed to have much to do with the development of harsh, strident tones. Hard, unresonant, nasal qualities of voice are held to be much more common in rigorous climates than in southern countries.

11. **Throatiness.**

A peculiar quality of voice known as "throatiness" is due to a condition in which the posterior portion of the tongue is elevated, when the soft palate is raised against the posterior wall of the pharynx. This quality is also present in many cases of hypertrophied tonsils, the presence of the latter in the oral resonance chamber altering the timbre of the voice.

Hypertrophy of the tongue may prevent the acquirement of resonant tones by altering the shape of the resonance chamber, and by reason of retarded, clumsy execution of lingual sounds.

An elongated or hypertrophied uvula may interfere with lingual sounds, and occasion much annoyance by causing frequent coughing and swallowing. It is generally caused by prolonged suction in early childhood. When a bifid uvula exists the speech is usually not affected unless the bifurcation extends sufficiently high to interfere with k and g sounds.

12. **Non-sibilant Voice.**

When no deformity or physical defect exists in the speech resonance chambers, a non-sibilant or high pitched voice of unpleasing quality is frequently due to shallow breathing and
respiratory disturbances. The attempt to speak with only residual air in the lungs, rather than upon a fresh inspiration will produce such speech in some cases. It is also found that affectations of the thymus and thyroid glands are associated with this type of speech. Atrophy or defect of the vocal cords is capable of producing high pitched tones, lacking in richness and without the overtones which are found in the voice of lower pitch. The human voice is rich in overtones which within a certain range reenforce and bring out the fundamental tone. Lower pitched voices possess more overtones, and are therefore generally more pleasing because of the richness, clearness and resonance.

Post nasal catarrh oftimes involves the postero-superior surface of the soft palate causing the uvula to hang in a relaxed condition. This gives rise to a tickling sensation and cough which is annoying to speakers or singers particularly. Catarrh may modify the quality, timbre, and range of tone.

Persons of tubercular tendency and those affected by the disease in its various stages find the voice altered by a loss of resonance and lack of sibilancy. As tuberculosis progresses toward the more advanced stage, the voice may be entirely lost.
13. Loss of Voice from Childhood Illness.

Rheumatism, particularly after typhoid fever, may involve the crico arytenoid joint, producing a hoarseness in speech accompanied by pain, and tenderness of pressure, of the arytenoid joint. From this ankylosis of the crico arytenoid joint with immobility of the vocal cord on the affected side, sometimes develops.

Scarlet fever and measles may be followed by throat complications and affections of the larynx. Palatal palsy, following diphtheria, is not uncommon. Speech sounds are slurred or lost, in this disease, posterior linguo palatals and nasals being affected due to the lack of separation of nasal spaces from pharynx, by the action of the uvula. (29)

Papilloma following whooping cough, may interfere with the motility and adjustment of the vocal cords, producing hoarseness, aphonia or spasm of the muscles of the larynx.

Loss of function with inability to phonate is a rather frequent sequence of scarlet fever and whooping cough, particularly when these diseases appear in early infancy. By training, the vocal cords may be strengthened and partially restored to phonation, but the vibrations tend to remain weak, and extensive training is necessary to inject life, change of pitch and emphasis into the tones.
14. **Defects of Voice due to Paralysis.**

There is found a wide diversity in symptoms of the various laryngeal palsies affecting speech. Normally, the edges of the vocal cords are straight on phonation, parallel and nearly in contact. Abduction takes place on deep inspiration and there is slight movement of the vocal cords in quiet breathing. In gradual degeneration of the laryngeal nerves the paralysis of the muscles follows a definite order (Semon's law). Disturbances of the posterior crico-arytenoids affects abduction first. The thyro arytenoids are then involved. Next the lateral crico-arytenoids are affected. In common abductor paralysis there may be no disturbance in vocalization, but the quality of the voice is generally changed.

Direct paralysis of the recurrent laryngeal nerve often results from lesions in the medulla oblongata. In unilateral lesions above the bulbar nuclei, paralysis of the cords does not follow, as for example, in hemiplegia, even though it be associated with aphasia. A bilateral lesion of the central tract, however, causes abductor paralysis. The arytenoid cartilage has a bilateral nerve supply and is not, therefore, affected in unilateral paralysis.
The speech process is under direct cerebral control, the centers controlling it being assumed to lie in Broca's convolution, and having connections with the areas presiding over the speech functions. Innervation is not from one hemisphere, only. The paralysis of the seventh nerve is most frequent. The peripheral distribution is generally affected, the paralysis being unilateral. Exposure is a common cause. In Reik's paralysis it is preceded by middle ear disturbance, direct inflammation of the nerve being present. Hemiplegia occurs in about one half of the paralysis cases, according to Osler. Hemilateral facial paralysis and muscular spasm may be associated. This may follow a severe emotional or traumatic shock, or an illness (diphtheria). The seventh nerve is frequently affected by disease. Paralysis may also be due to disease at the base of the brain.

In facial palsy one side may be affected, with hysterical contracture of the opposite side. This is liable to be confused with hemilateral paralysis. Monoplegia is irregular in its distribution; it may involve paralysis of the 3rd, 4th and 6th nerves, the facial nerve, or muscles of the larynx and pharynx. The tenth nerve is frequently involved in diphtheria. Such involvement may occur due to lead poisoning, arsenic poisoning, tumor, meningitis, tabes or syphilis. This nerve may also be affected by hysterical condition of the gastro-intestinal,
respiratory and circulatory systems.

Oppenheim reports a slight paralysis of the throat and palate muscles, due to the ninth nerve,—the glossopharyngeal. This is rarely involved by itself, but may be, in conjunction with other nerves.

Unilateral weakness of the larynx and palate are conspicuous in one sided paralysis. The soft palate is relaxed, and hangs away from the affected side, not functioning perfectly in phonation. Speech is nasal and there is difficulty in swallowing. The vocal cord on the affected side does not take part in phonation and respiration. There may be lack of sensation in the pharynx and larynx.

Paralysis of the third, fourth, sixth or seventh nerves often involves the muscles of expression. The tongue, larynx, or palate tends to become affected through the paralysis of the ninth, tenth or twelfth nerves.

Various forms of paralysis affecting speech may occur in adult life. In such cases it is often hereditary. Birth injury frequently results in paralysis of muscles associated with speech. Typhoid fever is sometimes followed by paralysis of the larynx, both adductors and abductors being affected. (41).

Affections of the thymus and thyroid glands are also associated with paralysis.

Bulbar palsy and cortical paralysis are often present at birth. In such cases the prognosis for speech training is hopeless.
14. **Aphonia.**

The functional inability to speak, is called aphonia. It differs from aphemia in that it is not central in origin. In normal children it may be due to hysteria, paralysis of the cords or laryngeal nerves, or to glandular enlargement, or tumor.

Stubborn and wilful silence is not infrequent in the insane, and not unusual among mentally deficient children. It sometimes occurs in normal children. Aphonia occurring among girls, at puberty, may be the result of thyroid gland enlargement, and is generally accompanied by a rapid pulse, nervousness, tremors, goitre, and prominent eye-balls. There results an interference with respiration, and each attempt to speak may be inhibited.

The mental attitude is important in dealing with this disorder, since it tends to verge on hysteria and the inability to speak increases the fear and lack of confidence, and tends to weaken the will power.

In hysterical aphonia we find a functional paresis of the vocal mechanism which is temporary. It may affect the oral mechanism alone, or it may involve both the oral and laryngeal mechanisms, producing a bilateral paresis of the adductor muscles, without any disturbance to the abductors. The hysterical mute makes no effort to speak, as a rule, while the asphasic, however disabled, always tries. In the army many cases of mutism have been cured by the inhalation of chloroform.
15. **Aphasia.**

In accordance with the most recent investigations regarding cerebral localization, the speech center includes certain cortical areas of the lateral surface of the hemisphere. In right handed individuals it is located on the left side, in left handed individuals the opposite is true. The motor speech center lies within Broca's convolution in the region of the base of the inferior frontal gyrus. Upon its integrity depends the ability to carry out the co-ordinated movements necessary in speaking. Injury to this region may interfere with speech, so that the individual cannot perform the movements necessary for voluntary speech, the repetition of words or reading aloud being impossible. This is, therefore, called the center of motor asphasia. The speech auditory and visual centers may be involved in cases of aphasia. (5, 32,).

In motor aphasia the patient can neither speak spontaneously nor repeat; moreover, since reading and writing depend upon integrity of the sensory as well as the motor centers, reading, spontaneous writing and dictated writing are also impaired. He may, however, understand what is spoken and copy writing.

In sensory aphasia comprehension of speech is lost; further, repetition, reading and writing to dictation are impossible, while spontaneous writing, copying and speech are retained. The speech, however, manifests the symptoms of paraphasia, (the substitution of incorrect words and mutilation of words and phrases)
Destruction of both sensory and motor centers leads to total aphasia. It may be possible to educate the corresponding hemisphere on the opposite side, and in such cases, under favorable conditions, the education of the speech center is accomplished in much briefer time than is the case with the infant learning to talk.

I. The results of this experimental and analytic study of approximately 500 cases show that these speech defects are psychophysical in nature, depending upon organic and functional conditions.

II. Speech correction is most favorable in children of normal mental ability whose physical condition favors rapid progress. Vocal defects due to defective hearing, paralysis, loss of function and aphasia require a much longer period of treatment. The speech of mentally deficient children may be improved but the acquirement of normal speech is doubtful.

III. Treatment involves the correction of physical defects, physical upbuilding, mental hygiene, vocal training and orthogenics.
PART III.

TYPE CASE STUDIES.
OUTLINE.

I. Preliminary Examination.

A. Physical.

1. General physical condition.
2. Date of birth; place; parentage; disease history of parents, disease history of child.
4. Preliminary examination at the Iowa Child Welfare Research Station, Iowa City, September, 1918.
5. Report of examination and recommendations by Dr. Walter J. Biering, September, 1919.
6. Report of examination by Dr. Albert H. Byfield of the University Hospital.
7. Report of examination by Dr. W. W. Martin, of the University Dental Clinic.
8. Report of hearing test given by Mr. C. C. Bunch, Psychological Laboratory.
9. Report made after examination by Drs. Boiler and Peterson at the University Eye, Ear, Nose & Throat Clinic.
10. Anthropometric Measurements, made by Miss Lora Hadley, of the Research Station.

B. Mental Examination.

1. Examination by Miss Eloise Vest, of the Research Station.
2. Five point summary by Miss Hadley.

C. Speech Examination.

1. Child's specific stuttering difficulties.
2. Fundamental speech problems.

D. Specific Fundamental Problems.

1. Elimination of stuttering difficulties.
2. Physical upbuilding.
3. Diet supervision.
4. Environmental conditions.

E. Prognosis.

F. Recommended plan of procedure.

II. Method of Training.
A. Story of his coming and procedure in case.
B. Daily program.
C. School progress.
D. Speech drill.
E. Phonographic records.

III. SUMMARY.
G. P. was first brought to the Iowa Child Welfare Research Station for examination in September, 1918. At this time the child was ten years old. He was born in a rural community, in Iowa. Beside this boy, there is one other child in the family, a girl nineteen months his senior.

The family history as represented gave no evidences of abnormality on either maternal or paternal side, other than the fact that a maternal uncle had been a stutterer. The economic status was above the average. The father was a retired farmer, and was characterized as "quiet and retiring by nature." The mother had taught school for some eleven years before marriage. The oldest child, a girl, was born during the first year of marriage and was reported to have stuttered slightly, at two years of age, for a brief period. During the seventh month of the second and last pregnancy a miscarriage was narrowly averted. The boy was born at term, following a difficult labor, and was pronounced by the attending physician as "no good". He was revived however, and entered upon an enfeebled infancy, followed by a childhood of low vitality. After the birth of her children, the mother developed exophthalmic goitre.
The boy was reported by the mother to have stuttered first at the beginning of the third year, having talked "very plainly during the second year, and from the time he first began to talk, at about twelve months", until the third year. The stuttering has persisted with varying degrees of severity up to the age of ten years.

A symptomatic picture of the boy at the time of the first examination is that of a "child of ten years, apparently undersized and malnourished, with a thin, pale face which is a sensitive barometer to fluctuations in physical and psychical condition. His body is inclined forward in walking. There is cyanosis of the extremities and slight Warner nerve signs; over-tonicity of the muscles about the eyes; easily fatigued, and unable to compete with other boys of his group in speed and endurance. His reactions are modified by erratic responses due to morbid introspections."

The writer further noted the peculiar shaped head of the boy, which seemed disproportionate to the rest of his body. There were indications of adenoid growths and the tonsils appeared enlarged. Nerve signs and the mother's
report of occasional enuresis led the writer to recommend a thorough physical examination by reputable physician, as the need of circumcision was suspected.

The speech was that of an habitual stutterer, with spasmophilia of the facial and respiratory muscles during speech, and slight involvement of the frontal muscles.

The boy was examined by Dr. W. J. Bierring of Des Moines, in September, 1918, his report as stated in a letter by the mother being, "diseased tonsils and adenoid growths, with need of operation for circumcision". The child was then taken to Cottage Hospital, Creston, Iowa, where tonsils and adenoids were removed and operation for circumcision performed. According to the mother's written report, there was considerable white cartilage growth and a very tight foreskin. The tonsils were found to be abscessed and the adenoid growths small.

Two days after being operated upon, the child was taken home, and at the mother's request, the nutrition expert at the Child Welfare Research Station recommended a diet program. The writer further suggested that the child be kept out of school for some weeks, and that he be allowed to exercise in the open as much as possible, and that his music lessons be discontinued. The mother, being anxious that the boy should not miss school, placed him in the grades again at the expiration of two weeks.
The diet recommended for this period was as follows:

- Milk with tapioca custards, well cooked.
- Beaten egg yolks and a little cream.
- Creamed vegetables; soups.
- Soft custards or junkets.
- Milk toast.
- Ice Cream.
- Creamed chicken.
- Corn starch.
- Blanc mange with cream.
- 3/4ths. qt. of milk daily.

In January, 1919, Dr. Albert H. Byfield of the University Hospital, made the following report on the case: "Spasmophilia of the facial muscles; marked pyorrhea; signs of both rickets and latent tetany; evidences of 'indigestion' (coated tongue and pyorrhea). Atypical cranium; slight prominence of forehead suggestive of the Olympic Change. Might be due to rachitic change." These conclusions were based on a thorough physical examination. Special diet, cod liver oil, attention to teeth and considerable speech drill, with attention to mental condition were recommended by Dr. Byfield.

On January 25th, 1919, the child was taken to the University Dental Clinic for examination. A loose tooth, a decayed first molar was removed by Dr. Rogers, who referred the case to Dr. W. W. Martin, specialist in orthodontia. His report was as follows: "Malocclusion comes under the type of neutroclusion, with labioversion of the upper anterior teeth, both arches badly contracted, the lower teeth being slightly bunched, pa-
tient having the appearance of being a mouth breather. Malocclusion should be corrected, and it would probably improve speech and banish mouth breathing.

A hearing test was also made in January, 1919, by Mr. C. C. Bunch, at the Psychological Laboratory. This was reported as negative, the hearing being practically normal in both ears.

A further examination at the University Eye, Ear, Nose and Throat Clinic, June 9th, 1919, upon recommendation of Dr. Byfield, was reported by the examining physicians, Drs. W. F. Boiler and R. A. Peterson, Assistant, as follows:

"Eyes. Definite refractive error; marked retinal hyperemia; asthenopia.

Nose; Moderate mass of adenoid tissue.
Possibility of sinus disease.

Throat; Cervical glands palpable."

The verbal recommendations made by these physicians at this time were, that the child should be placed in the hospital for observation and receive eye treatment, and be fitted for glasses.

The anthropometric measurements of the boy, reported by Miss Lora Hadley of the Research Station were:

- Height, 139.1 cm. (Average, 142.3 cm. for 11 yr. old boy.)
- Weight, 33.453 kg. (Average, 35.335 kg. for age and height.)
- Dynamometer, (R. 20 kg. (L. 20 kg. (Average 18.5 kg. R. " 18.3 kg. L.)

Head of peculiar shape, but measurements show little
variation from normal.

The child's breathing capacity as registered on the spirometer was below normal.

The psychological examination given by Miss Hadley, briefly stated, was as follows:

"The boy presents a diversity of unfavorable tendencies and weaknesses aggregating a morbid condition of mind. The generic cause is probably prenatal. As the son of a nervous, introspective mother, reared in a neurotic atmosphere, he has developed into a physical weakling. His habitual emotional tone is low. He is susceptible to happy surroundings, and with direct personal encouragement responds well.

"He is reported as "forgetful" or neglectful in daily tasks. He shows interest in mechanical objects, but is not a great reader.

"He is embarrassed in the presence of children, but becomes animated with talking to adults, using an adult vocabulary.

"The boy does not share in the active sports of childhood, seeming unable to cooperate. He does not care for other boys of any age, preferring to play with girls. These peculiarities might be accounted for by his inability to compete with other boys. An important factor in his lack of willingness to
enter a competitive sport may be due to his susceptibility to fatigue. His muscles are flabby and fatigue appears after little exertion.

"After seven weeks' observation, the following estimate of the reactions of the child was made on an adaptation of Witmer's five point Analytic Diagnostic Scale.

"Vitality.

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Social Reaction to Group.

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</table>

Total, 72
"Later observation showed that his social and mental reactions were dependant to an unusual degree upon circumstances. His extreme sensitiveness to criticism made a fixed estimate of his reactions impossible."

A summary of the Terman tests given by Miss Eloise Vest of the Research Station yields the following points:

"Chronological age, 11 yrs. 1 Mo.  
Terman age, 11 yrs. 5 mos.  
Intelligence quotient, 103."

"Good reactions. Interest and effort excellent. Good motor coordination. Expresses self well, having good vocabulary."

"Failed on Ball Field Problem, a test used by Terman for determining practical judgment in meeting the demands of a real situation. Showed less imagination than most children of his grade in the tests involving the interpretation of pictures. Failed in only one test below his age level, that being Ball and Field Problem in the eight year group."

In this connection it is perhaps worthy of note that in all cases of stuttering examined at the Research Station, and given both mental tests and speech examinations, Miss Vest finds this lack of imagination evident on the part of the child. The theory of repression as shown in stuttering or hesitant speech is admissible, but that it coincides with
the Freudian theory as to sexual content, there is little evi-
dence in this case.----------------------------------- The boy avoids
his own sex apparently because of his inability to compete
with them in feats of strength, and his ability to successful­
ly compete with girls and avoid the ridicule of boy com­
panions for failures. Bleumel's theory of transient au­
ditory amnesia seems feasible, and the "lack of memory" in
this case may be due to the inhibitions practicing by the
child in seeking to avoid the necessity of reproducing from
memory and translating into speech his auditory experiences.
There is the same reluctance to reproduce visual experiences,
and the writer believes that further study of the case from
the psychological point of view will reveal definite defect
in imagery.

The writer diagnosed this as a case of stuttering of
long standing, associated with several organic disorders.
There was marked spasmophilia of the facial and respiratory
muscles during speech, with some involvement of the frontal
muscles and protrusion of the eye-ball in the attempt to speak.

The child's specific stuttering difficulties were on
the production of the following sounds; vowels o, a, u, used
in initial position, and on varying consonants when they pre­
ceeded these vowels; consonants p, b, m, (labials); f,v,(labio-
dentals); t, d, n, r, l, s (sh), (linguo-dentals); k, g, j, h,(ch), (posterior linguo-palatals); when all these were used in initial position ; w and y used as vowels, in initial position.

The stuttering varied , but was found upon practically every consonant in one combination or another at the beginning of words. During protracted attempts to speak the hypertonicity of the speech mechanism frequently communicated itself to the muscles of the arms, head and trunk.

The fundamental speech problems were (1), to eliminate these difficulties and to secure proper breath control in order to establish normal functioning of the vocal mechanism. (2), to improve the physical condition of the child thru proper medical and hygienic measures.

The specific fundamental problems then, in summary, were (1), the elimination of the stuttering difficulties, (2) Physical upbuilding, (3) diet supervision , (4) control of environmental conditions.

The prognosis was as follows; The chances for considerable improvement seem favorable. if physical defects are first attended to. Weakness of will power and mental depression are unfavorable symptoms, and make the time element appear most uncertain as to necessary duration of treatment. The congenital weakness of the muscles controlling speech must be overcome.
Without some prophylactic measures he may develop a definite psychosis.

The recommendations of the writer at the preliminary examination in September, 1918, were that the child be first examined by a reputable physician, the necessary medical measures followed, and that the child be returned later to the city for observation and treatment at the Research Station. It was further recommended that special cottage for the care of such children be provided, or that the child be placed in selected environment under at least partially controlled conditions, until such time as his physical handicaps should show improvement and his stuttering eliminated.

Training following a definite line of procedure was begun January sixth, 1919, the mother coming with the child, and remaining to take charge of him during treatment. It was soon evident that her presence acted as an inhibition upon the boy's development. The boarding house which had been selected was also found to be unsatisfactory. The child was placed in a family where there were two active boys, one of his own age, and another older. The mother then returned home, during the fifth week of treatment.

In the new location the boy was under partially controlled conditions, a food schedule being prepared, and fol-
lowed reasonably well by the woman in charge of the child. The diet was a difficult problem as the child cared for an excessive amount of sweets, and for very few greens or vegetables, yet possessed an abnormally hearty appetite. He ate usually more than either of the two normal, healthy boys of the household, both of whom were larger and heavier in weight than he.

It was felt that restoration to normal speech in this case depended very largely upon physical upbuilding. At the end of a four weeks trial of full day school attendance in the University Elementary School, the obvious fatigue apparent at the end of each school day, caused both writer and teacher to recommend half day session for the child. He was not only easily fatigued by each school session, but was slower than the average child in time reactions and in performance tests. As the teacher agreed to advance him with his grade, if he did satisfactory morning work, the mother consented to allow the child to drop the afternoon session of school. He continued under this plan until he returned home, June 13, 1919.

From January to June he received dental treatment at the University Dental Clinic under direction of Dr. W. W. Martin, who reported the teeth as responding well to treatment, the
upper arch widening after the application of the appliance. As it took a longer time than had been anticipated, to prepare the lower teeth for the application of the appliance, it was necessary for the child to return to the city semi-weekly, during the summer months, for treatment. On these occasions his speech was carefully noted, and the training continued.

When examined by Dr. Boiler and Dr. Peterson in June, eye treatment had been suggested, together with hospital observation. The mother therefore accompanied the boy to the city August 7th, 1919, in order to interview the physicians. From August 9th to August 12th the boy's eyes were treated at the Eye Clinic, at which time Dr. Boiler reported that he felt it inadvisable to fit the boy for glasses, his eyes having responded well to treatment and the boy's general condition being much better than when examined in June. Dr. Boiler further reported marked improvement in the tonsillar condition, the cervical glands at this time appearing normal. At the end of four days of observation he felt that it was unnecessary for the child to be placed in the hospital for further observation.

An interview with Dr. Byfield, August 14, 1919, led us to the conclusion that home care, under the prescribed diet,
Continuing the use of cod liver oil, with occasional trips to the city for orthodontic work should be continued for the summer; that the child be allowed to enter school at home in the fall, and that he be carefully observed as to physical condition and speech, when in Iowa City. Should a noticeable speech lapse occur, lasting for any length of time, he should be returned to Iowa City for further treatment and speech training.

As to detailed procedure in the case, a special program was arranged for each hour of the day, giving attention to diet, toilet habits, rest, recreation, school training, speech drill and psychoanalytic work. (p. 66.)

The nutrition specialist, Dr. Amy Daniels of the Research Station, reported him under weight, undersized and malnourished. Her diet outline is given in detail. (Pp. 60 & 68.)

Bi-monthly phonographic speech records were made of the child's speech, from January 10th to May 30th, 1919; a detailed report of these records showing material used, time, elimination of errors and final results being here given, with chart. (Pp. 71-81.)

Variations in weight as recorded by Miss Hadley are also shown on the accompanying weight curve.
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>7:00</td>
<td>Rise, bathe,</td>
<td>Same,</td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
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<td></td>
<td>dress quickly.</td>
<td>daily</td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
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<td></td>
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<td>program.</td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
</tr>
<tr>
<td>7:30</td>
<td>Breakfast.</td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
<td>Rise at 8:30.</td>
</tr>
<tr>
<td>8:00</td>
<td>Brush teeth.</td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
<td>Rise at 8:30.</td>
</tr>
<tr>
<td>8:30</td>
<td>School work.</td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
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<tr>
<td></td>
<td></td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
<td>Light work</td>
<td>Walk or play.</td>
<td>Play.</td>
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<td></td>
<td></td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
<td>or play.</td>
<td>Play.</td>
<td>Play.</td>
</tr>
<tr>
<td>12:10</td>
<td>Luncheon,</td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
<td>Dinner at 1:30</td>
</tr>
<tr>
<td></td>
<td>after diet</td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
<td>Dinner at 1:30</td>
</tr>
<tr>
<td></td>
<td>schedule.</td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
<td>Dinner at 1:30</td>
</tr>
<tr>
<td>1:00</td>
<td>Rest until 3:00 P.M.</td>
<td>Rest till</td>
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<td>1:40</td>
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<td>3:00</td>
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<td></td>
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<td>Relax and take a good nap.</td>
<td>Rest till 1:40</td>
<td>Rest till 1:40</td>
<td>Rest till 3:00</td>
<td>Rest till 3:00</td>
<td>Rest till 3:00</td>
</tr>
<tr>
<td>2:15</td>
<td>(Rest)</td>
<td>Speech Training class.</td>
<td>Drill work, Speech Tr.</td>
<td>(Rest)</td>
<td>(Rest)</td>
<td>(Rest).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Miss M.</td>
<td>Miss M.</td>
<td>(Rest)</td>
<td>(Rest)</td>
<td>(Rest).</td>
<td></td>
</tr>
<tr>
<td>4:00</td>
<td>Baseball or other game with boys.</td>
<td>Games.</td>
<td>Play.</td>
<td>Outdoor games. Speech lesson, Miss H.</td>
<td>Play.</td>
<td>Play.</td>
<td></td>
</tr>
<tr>
<td>5:00</td>
<td>Quiet hour. Prepare for dinner, or read and rest.</td>
<td></td>
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<tr>
<td>6:00</td>
<td>Dinner after diet schedule.</td>
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</tbody>
</table>
**Evenings.**

7:00 to 7:45 Games, such as the aviation card game, authors, bird game, flinch, etc', may be played with the other boys.

May read half an hour when there is no game to play, provided there is good light.

Lectures, moving pictures or other evening entertainments not to be attended on a school night.

May go to these on Saturday and Sunday nights, or Saturday afternoons.

Bathe freely and frequently during the week, taking a shower once a day, and a warm bath once a week, if it can be arranged.

**General Directions.**

Get an alarm clock and set it for afternoon appointments, so you may go to sleep until it is time to keep your appointments.

Ride your bicycle often, but do not ride when over tired, or until you are fatigued.

Try to keep happy and cheerful and when anything disturbs you, see Miss S. at once and let her help you.

Remember to drink your milk each day, so that your weight may steadily increase.

Brush teeth and go to the toilet before going to bed.
DIET SUGGESTIONS.
DR. AMY DANIELS.

General.

1 egg per day.
At least 3/4ths qt. of milk per day.
Variety and plenty of vegetables.
Some cooked cereals.
Fruit to overcome constipation.
(Such as stewed prunes and figs.)
Less fat; little butter; fewer sweets; avoid candy.

Specific suggestions.

Meat (not oftener than once a day).

Potato.
Vegetables (one or more).
Spinach,
Turnip,
Carrots,
Cauliflower,
Tomatoes,
String beans,
Lettuce,
Celery,
Beets,
Cabbage,
Parsnips.

Meats.
Should not be over fat. Avoid sausage.
Avoid fat pork and fried meats.
Use stews, roasts, steaks, chops, fish, (except salmon; oysters particularly good).

Desserts.
Custard pudding.
Stewed fruits.
One sweet cookie or one piece of cake only.
Rice pudding; bread puddings; fruit whips.
Gelatine pudding; apple pudding; fig pudding.
Prune pudding.
Supper Dishes.

Creamed soups.
Milk toast.
Creamed eggs.
Macaroni.
Scalloped potatoes.
Toast, muffins or graham bread.
Fruit or a simple pudding.
A succulent vegetable.

Dinner should include fruit and two vegetables.
(i.e. One succulent and one starchy vegetable).

Glass of milk to be served to child with each meal, and a glass in mid-afternoon.
Weight of G.P.

Jan. 24, 1919.  71-1/4 lbs.
Feb. 8th       72-5/8
Feb. 25th      72-7/8
March 8th      77-1/2
March 21st     77
April 8th      77-7/8
April 15th     77-1/2
April 24th     78
May 14th       75-5/8
May 29th       73-3/4
June 10th      75-5/8
June 24th      77
July 9th       76-1/2
July 25th      77-3/8
Chart I

- Two Sessions of school.
- One school session.
- Forgot to drink milk.
- Extensive dental treatment
- After return home, when taking Cod Liver Oil.
Speech Training, January to June, 1919.

The method employed was a modification of the Liebmann and Scripture systems, primarily. Adaptations from Gutzmann, Wyllie, Twitmyer, S. A. King and S. S. Curry have also been used in the training.

Each day's lesson included the following outline.

I. Breathing exercises for the establishment of normal breath control.

II. Tongue and mouth gymnastics, for education of the speech mechanism.

III. Harmonic Gymnastics.
   a. To eliminate hypertonicity of muscles functioning in speech.
   b. To relax muscles to which hypertonicity has habitually communicated itself.
   c. To establish poise and erectness of bearing.
      (Child had protruding abdomen, hollow back, winging scapula, and carried head in drooping, indolent fashion.)

IV. Speech drill.

15 to 20 minutes was devoted to the first three points each day, the remaining forty minutes of the hour's lesson begin devoted to speech drill.

The speech drill was progressively arranged, and covered the following outline.

A. Vowel drill on vowel sounds.
B. Drill on consonant sounds, showing how contacts are made for the various consonants (using mirror).
C. Combination of vowels and consonants into words, phrases and sentences for clear-cut enunciation.
D. Linking of words into phrases for smoothness and freedom from hesitation.
E. Speech Melody and Inflection.
   a. Use of the octave twist.
   b. Chanting.
   c. Singing of simple songs.
   d. Application of speech melody to words, phrases, sentences, paragraphs and short stories.
e. Words practiced with rising and falling inflections.
f. Same in sentences.
g. Emphasis.

F. Exercises for increase in volume of tone.
a. Use of megaphone, first whispering words with good breath supply; same, speaking distinctly.
   Same, shouting.
b. Repetition of 1, 2 and 3 without megaphone.
c. Speaking loudly and then softly in imitation of echo.
d. Whispering loudly and then softly.
e. Speaking, while class whispers in concert.
f. Calling to persons at a distance; speaking to an imaginary and then to a real audience.

G. Training for character building and establishment of self-confidence.
a. In imaginary situations.
   1. Playing store keeper.
   2. Playing customer.
   3. Giving orders over the telephone.
   4. Answering inquiries over the telephone.

B. Dramatization. **
1. One act sketches such as "Lord Cornwallis' Knee Buckles," "The Brahmin, Tiger, and Six Judges."
2. More complex sketches, such as scenes from Robin Hood, Hercules' Labors, Cinderella, Ali Baba and the Forty Thieves; or historical incidents emphasizing heroic traits of character.

H. Speech drill in paragraph and story form.
a. Reproduction in action (pantomime).
b. Reproduction in story form, for imaginative training.

I. Conversations.
a. In imaginary situations.
b. In real situations.
   1. Over the telephone.
   2. Errands.
   3. Situations created to secure the child's reaction.

J. Training to secure successful transfer of normal speech to meet any situation, outside speech training class.
Dramatization seems helpful in dealing with the stutterer, as it enables the child to appear in a new role, in which his own personality tends to merge into that of the character he represents. He forgets to be self-conscious as he loses himself in the play, and if, directly or indirectly, the fact that he can speak easily, is established in his mind, his assertiveness and self-respect tend to increase. As a severe stutterer is often a good singer, likewise the writer often finds that such a child will frequently take the part of a character in a play without stuttering.

The material used for making the phonographic speech records, together with analysis of same, is as follows:

Record I. Jan. 10, 1st week.

Material.

1. Vowels with rising and falling inflections to show range of tone, as for example:
   - Ah (rising), ah (falling).
   - Ee " ee #
   - Oh " oh "

2. Vowel sounds to show volume of tone (soft, loud, soft).

3. Sentences after Wyllie, containing all the consonants in initial position.
   - 1. A queer extra, yellow jacket. (Wyllie).
   - 2. Peter Brown made white wax. (W.)
   - 3. She very leisurely took down nine large red roses. (W.)

4. Fable of the Fox and the Crow, containing all five vowels used in initial position. Three and four, made up of the sentences and fable, were timed, as is shown in accompanying table.

Record II. Jan. 24, 3rd week.

After drill had been given on the sounds giving difficulty, the above test was repeated, no use of the testing material having been made in the meantime. This was timed, errors tabulated and eliminations of errors noted.
Record III. Feb. 7, 5th week.

Material.
(1) Words for range of tone, such as;
   see (rising) see (falling)
   yes " yes "
   no " no "
(2) Words showing volume of tone, as;
   Come, (begun softly, increasing in volume on vowel sound, and ending softly).
   Home,---------.
   Oh,---------.
(3) Sentences arranged by writer containing alliteration of difficult consonants p, b, m, k, g, f, v, t and d in initial position.
(4) Vowels a, e, i, o, oo in initial position, in proverbs.
   As; (Sentences).
   1. Peter Piper did pick some peppers.
   2. My mother made me my coat.
   4. Come quickly, the cows are in the corn.
   5. The good girl has a big dog.
   6. A few fine feathers do not make a fine bird.
   7. Vanity, vanity, all is vanity.
   8. The trained dog performed many tricks.
   9. Dare to do a good deed.
   (Proverbs).
   1. Early to bed and early to rise,
      Makes a man healthy, wealthy and wise.
   2. A word to the wise is enough.
   3. Many words won't fill a bushel.
   4. One today is worth two tomorrows.
   5. The sleeping fox catches no poultry.

Record IV. Feb. 21, 7th week.

The above test repeated, after drill on difficult sounds, no reference being made to the test material itself.

Time, errors and eliminations are noted in accompanying table, for sentences and proverbs given above.
Record V. Mar. 7, 9th week.

Material.

(1). Words showing range of tone.
(2). " " volume of tone.
(3). Sentences containing sounds of vowels, and consonants used in initial position, the numeral indicating the number of times each was used, as follows:
   a(2), b(5), d(3), e(1), f(2), g(1), h(3), i(1), j(1), k(5), l(2), m(1), n(1), sh(2), p(7), qu(1), r(1), s(1), t(6), th(voiceless,1), th(voiced,10), v(2), w(2)-(oo), wh(1), y(1).

(4). Short selection containing a, e, i, o, oo vowel sounds in initial position. As:-

(Sentences, arranged by writer).
1. Patty bought more white wafers.
2. A few fine villages.
3. The tall timbers cover two lots.
4. Come quickly, the cows are in the corn.
5. Verily, he has saved enuf to prevent poverty.
6. I think that will do.
7. Does Zeus answer the people thus?
8. Peter paid the price gladly.
9. Ring the library bell.
10. George can bring the bugler's horn.
11. She tried to drill nine youths.
12. The ship bore treasure.

(Selection for vowel sounds).

"Have you seen an apple orchard, in the spring, in the spring? An English apple orchard in the spring? When the spreading trees are hoary with their wealth of promised glory, and the mavis pipes his story, in the spring!"

Record VI. Mar. 20. 11th week.

The above test was repeated, after training on difficult sounds, without reference in the meantime to testing material.
(13th week no record could be made. Machine out of order).

Record VII. Apr. 15, 15th week.

Material.

A short story was arranged by the writer, containing the following consonants and vowels used in initial position, the numbers referring to the number of times each was used.

\[
\begin{align*}
a(13) & , b(9) , d(8) , e(2) , f(8) , g(4) , h(16) , i(8) , j(2) , k(4) , l(3) , m(4) , n(2) , p(11) , qu(1) , \ddot{o}(4) , \ddot{o}(1) , oo(3) , r(5) , s(7) , t(5) , u(1) , w(13) , y(1) , ph as f(1) , wh(1) , th(voiceless, 1) , th(voiced, 21).
\end{align*}
\]

Story.

Peter, one day, wished to make some trench candles. So he took some wafers of white wax, heated them in a pan until they dissolved into a thin liquid. Then he found many of Phillip's thick newspapers. He then bought a quire of plain paper for the outside.

He folded the papers over and back and did not forget the directions. Bringing from his room some strips for wicks, he placed them in the center of each. Rolling the paper about it, and jamming it together, he fastened with mucilage the outer edge.

He was going to call George, but remembered that he had gone to choir practice at the church, after the bell rang, and would soon go by on his way back to the shop. It would be more pleasure to show him the result of the work done by one-self he thought. So he dipped the paper candles in paraffine, and after they dried, he lighted one. It gave forth a dim yellow light.

Record VIII. April 26, 16th week.

The above test repeated, after training on difficult sounds, no reference being made to testing material. (18th week writer out of town).

Record IX. May 16th, 19th week.

Material.

A short story based on the boy's own experience, containing the following vowels and consonants used initially.

\[
\begin{align*}
a(7) & , b(5) , d(3) , e(1) , f(1) , g(1) , h(5) , i(10) , j(3) , k(1) , l(4) , m(1) , n(2) , p(1) , r(2) , s(4) , v(1) , w(5) , wh(4) , y(2) , z(1) , th(voiceless 1) , th (voiced, 3) , sh(2).
\end{align*}
\]
(Record IX.)

Story.
Do you know where the boy's wheel is? He bought a fine new one in the village some days ago. I think he said that it was made in Chicago.
Perhaps George borrowed it. I saw him riding leisurely down Ninth Street. Is it a little, green wheel? I am sure he will bring it back in a little while.
He rides with zeal, and is a youth who likes exercise.

Record X. May 30, 21st week.
Material.
Story arranged by writer containing approximately twice as many vowels and consonants in initial position as appear in all former speech tests used thus far. As it was to be a final test before child's return home, it also included all the vowels and consonants used in middle and final position.
The results given in chart are approximate number of errors occurring in comparison with former records, or one half total number, record being made up of twice as many initial sounds. No errors were made on sounds in middle or final position.
Vowels and consonants in initial position;
a(28), b(9), d(5), e(1), f(9), g(5), h(19), i(6), j(1), k(3), l(4), m(3), n(6), o(8), oo(8), p(6), qu(1), r(4), s(14), t(15), v(2), x(1), y(1), z(1), Combinations; wh(4), sh(5), th(voiceless 1), th voiced, 24).

Story.
Mabel's father bought an expensive black and white Arabian steed. He told her to take care of it. He purchased a bridle and saddle, and showed her how to adjust the check rein. The horse dashed across the field and did not make friends at first. It was soon safe to drive him, however.
The girl took a bag of sugar to the pasture fence, and the steed seemed quite gentle. She swung the large rope halter over his head and adjusted it. Then she led the animal along the lane, fed him a small amount of bran, nodded to John in the corner of the field to open the gate. As he ran to obey, the horse gave a shrill whinney. He seemed to know that these were his masters, and there was no friction as the saddle was pushed over his back, and the girl took her place in the seat. She thought it well not to leave the even road at first, but to wait until the horse was aware of what kind of a driver she would be.
She knew that this was a very young steed, raised abroad, being used to zigzag paths and dizzy paces.
Recorx XI. Aug. 8th.
(Made on occasion of child's return to the city for dental treatment.) A review of all the tests to date had been given July 25th, there being no stuttering error in said oral record at that date.

Material.
Sentences containing all the vowels and consonants used in initial position as:-
- a(1), a(1), b(3), d(1), e(1), f(1), g(2), h(2), i(1), i(1), j(2),
- k(1), l(1), m(1), n(2), o(1), oo(3), p(2), qu(1), r(3), s(2),
- t(1), u(1), v(1), (w used as oo); x(1), y(1), z(1).

Sentences.
1. A quail existed in the yellow jungle.
2. Payson Briggs mowed the white waving grain.
3. Shelby very lesirely did the task, raising nineteen large rails.
4. Billy caught four hugh suckers with James's good, new rod.
5. Open the under box, and I will empty it here.
6. See the picture of the zebra.
**Table IV.**

Phonographic Speech Records. G. P.

<table>
<thead>
<tr>
<th>Record</th>
<th>Date</th>
<th>No. of words</th>
<th>Time used</th>
<th>Ultimate time after training</th>
<th>Errors</th>
<th>Different sounds erred upon</th>
<th>Total no. of errors</th>
<th>Errors eliminated</th>
<th>New Errors appearing</th>
<th>Reappearing</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Jan. 10</td>
<td>155</td>
<td>68 sec.</td>
<td>90 sec.</td>
<td>13</td>
<td>Vowels, i &amp; o. Con. s, t, f, n, m, l, r, k, &amp; th, tr, cr</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>Jan. 24</td>
<td>155</td>
<td>69 sec.</td>
<td>90 sec.</td>
<td>9</td>
<td>Vowels a, e, i, &amp; o, Con. k, g, m, n, h, j, v</td>
<td>12</td>
<td>Vowel i, a. Con. s, t, f, &amp; th, tr and cr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>Feb. 7</td>
<td>99</td>
<td>64 sec.</td>
<td>70 sec.</td>
<td>8</td>
<td>Vowels i &amp; oo. Con. d, p, t, b, f, t, b</td>
<td>12</td>
<td>Vowel e. Con. k, g, d, p, m, h, r, &amp; b</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>Feb. 21</td>
<td>99</td>
<td>62 sec.</td>
<td>70 sec.</td>
<td>5</td>
<td>Vowel e. Con. b, d, k &amp; t</td>
<td>7</td>
<td>Vowels i &amp; oo. Con. p, m, f</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>Mar. 7</td>
<td>108</td>
<td>65 sec.</td>
<td>80 sec.</td>
<td>4</td>
<td>Con. h, Omitted word &quot;fine&quot; Mispron. Zeus &amp; bugler</td>
<td>4</td>
<td>Con. d, t, k, h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VI</td>
<td>Mar. 20</td>
<td>108</td>
<td>64 sec.</td>
<td>80 sec.</td>
<td>2</td>
<td>Con. t, &amp; p</td>
<td>3</td>
<td>Con. h &amp; s, crd mispron.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>---------------</td>
<td>------------</td>
<td>-------------------------------</td>
<td>----------------</td>
<td>------------------------</td>
<td>----------------------</td>
<td>-------------------</td>
<td>---------------------</td>
<td>----------------------</td>
<td></td>
</tr>
<tr>
<td>VII. Apr. 15.</td>
<td>166</td>
<td>91 sec.</td>
<td>108 sec.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>all</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>VIII. Apr. 26.</td>
<td>166</td>
<td>75 sec.</td>
<td>108 sec.</td>
<td>Con.</td>
<td>2</td>
<td>2</td>
<td></td>
<td>Con. t &amp; k.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IX. May 16.</td>
<td>71</td>
<td>41 sec.</td>
<td>40 sec.</td>
<td>Con. l, Vow. co.</td>
<td>6</td>
<td>7</td>
<td></td>
<td>Con. l &amp; n. Vowel oo.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X. May 30.</td>
<td>198</td>
<td>61 sec.</td>
<td>122 sec.</td>
<td>Con. p, b, t, f, h, k, q &amp; l.</td>
<td>8</td>
<td>10</td>
<td>Con. n.</td>
<td>Con. b, p, t, l, f, h, k, q.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

July 25. Oral record. # # Review of all speech tests to date. This was wholly free from errors, and is indicated in the accompanying speech curve.

| XI. Aug. 8.   | 50            | 56 sec.    | 48 sec.                       | Omitted words, "white" & "hugh". | 2                      | 2                    | Elim. of all stuttering, diff. |                      |
Phonographic Speech Record of G.P.
January 10th to August 8th, 1919.

<table>
<thead>
<tr>
<th>Date</th>
<th>Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 10th</td>
<td>15</td>
</tr>
<tr>
<td>January 24th</td>
<td>12</td>
</tr>
<tr>
<td>February 7th</td>
<td>12</td>
</tr>
<tr>
<td>February 21st</td>
<td>7</td>
</tr>
<tr>
<td>March 7th</td>
<td>4</td>
</tr>
<tr>
<td>March 20th</td>
<td>3</td>
</tr>
<tr>
<td>April 15th</td>
<td>0</td>
</tr>
<tr>
<td>April 26th</td>
<td>2</td>
</tr>
<tr>
<td>May 16th</td>
<td>7</td>
</tr>
<tr>
<td>May 30th</td>
<td>10</td>
</tr>
<tr>
<td>July 25th</td>
<td>0</td>
</tr>
<tr>
<td>August 8th</td>
<td>2</td>
</tr>
</tbody>
</table>
The pictures shown at the left in each of the accompanying cuts represent the degree of malocclusion existing before orthodontic treatment was begun at the Dental Infirmary in May, 1919. The pictures at the right show the improved occlusion ten months later, (March 1920) the most important results being, first, the widening of the mouth space (1/8 inch in the canine region and 3/8 inch in the premolar region); second, the correction of the inward slant of the premolars to normal position; third, correction of the incisors of both upper and lower arches; fourth, the development of the premaxillary bone. Since these corrections have been made proper mastication of food has been secured, right habits of breathing are being established and physical growth has been accelerated.
Chart II.
Phonographic Speech Record of G. P.

Jan. 10 to Aug. 8, 1919

The State University of Iowa

- Two sessions of school attended.
- Attending one session of school.
- Frequent dental treatment leading to fixture of appliance
- Child taking Cod Liver Oil. (Sent home June 16th.)
SUMMARY.

I. This case is that of a stutterer of the morbid, hypersensitive, introspective type, physically sub-normal, with slow, deliberate mental reactions.

II. Restoration to normal speech is in this case dependant primarily upon physical upbuilding, diet supervision, normal social relationships with boys of his own age, rest, relaxation, hygiene and speech training. Sympathetic stimulation and development of self confidence are necessary.

III. The child should be placed in new environment, preferably under entirely controlled conditions.

IV. Variations in the weight and speech curves indicate that (1) there was no improvement during the first month; this condition remained practically the same until he began to drink milk, and the school day was shortened to a half day session; (2) The highest point in the weight curve came April 8th, and the height of the speech curve, April 15th, or when the weight had diminished slightly, owing to forgetfulness of child in regard to drinking milk, presumably. Speech was not affected by drop in weight in this instance; (3) With the onset of disagreeable muscle sensations and necessity of making adjustment, due to the placing of dental appliance for widening the arch, there was a marked speech disturbance, digestive
disturbances, and a marked decrease in weight, all of which reached a maximum about May 30th. (4) Increase in weight about June 1st, coincides with beginning of Cod Liver Oil treatment. Speech improvement also, is evident at this time.

V. The principal speech difficulties due to spasm of the diaphragm and spasmodophilia of the facial muscles with hypertonicity of the speech mechanism were overcome by:

(a). Establishment of normal habits of breathing.  
(b). Vowel and consonant drill.  
(c). Transfer of attention from habitual errors and feeling of inefficiency, to clear-cut, distinct utterance, with emphasis and inflection, under various circumstances.

VI. The phonographic speech records show a reduction in errors by stuttering, from 15 errors in the first record, to 0 errors in the fourth month; an increase in stuttering up to 10 errors in the fifth month, and a reduction to the 0 point in the seventh month, with two errors in the final record, eighth month.

VII. The progress in this case was limited by the physical condition of the child. It became increasingly evident that many months would be required for entire restoration to normal condition of speech, as incorrect habits had been some twelve years in duration. Lack of absolute control in environment was a further handicap in treatment.
VIII. The value of the treatment is evident in parental reports since the child's return home, and in his continued gain in weight and speech improvement as noted upon his monthly visits to the city for dental treatment and speech work. In the interim between Aug. 8th and Nov. 7th, 1919, he is reported by parents to have gained 12 pounds. His social reactions are reported as much improved in school relations, his increase in confidence and gain in speech is apparent in his school work and his desire to seek opportunities for self-expression in speech. The latter is illustrated by the fact of the boy's having taken part in a play recently, in which he spoke from 12 to 15 lines, without stuttering, and with no fear, but showing evident enjoyment of the occasion.
TYPE CASE STUDY. II.

Outline.

I. Preliminary Examination.

A. Physical examination.
   1. General physical condition.
   2. Date of birth, place, parentage, disease history or parents, disease history of child.
   5. Report of examination by Dr. Field of the University Hospital.
   6. Report of home physician, as stated by parents.

B. Mental Examination.
   1. Examination by Dr. Sylvester of the Psychology Department.
   2. Examination by Miss Eloise Vest, Research Station.
   3. Examination in imagery by Miss Hadley of the Research Station.

C. Speech Examination.
   1. Child's specific stuttering difficulties.
   2. Fundamental speech problems.

D. Specific Fundamental Problems.
   1. Elimination of stuttering difficulties.
   2. Physical upbuilding.
      3. a. General systemic condition.
         b. Nervous control.
   3. Diet Supervision.
E. Prognosis.

F. Recommended plan of procedure.

II. Method of Training.

A. Story of her coming.
B. Daily program.
C. School progress.
D. Gymnastic program.
E. Speech Drill.
F. Phonographic records.

III. SUMMARY.
N. K. was brought to the Research Station by parents for preliminary examination, October 14, 1918. She was then thirteen years of age, born in eastern Iowa, in a rural community, and being an only child.

The family history as reported by parents gave no evidence of disease on maternal or paternal side, other than "nervousness" in the mother's family. A maternal uncle was reported who had been for many years a stutterer. Parents felt there could be no element of imitation in the child's stuttering habits, as said uncle lived some ten miles distant and rarely were visits exchanged.

The birth of N. K. was reported as normal, and aside from the usual childhood diseases, chicken pox, and measles, followed by whooping cough, there had been no sicknesses. These diseases had not left any appreciable ill effects. There was no history of shock or severe fright with the possible exception of a fall from pony at ten years of age, when child sustained a broken collar bone.

The mother reported that when child began to go to school she had shown slight tendency toward stuttering, but that it soon disappeared. Occasionally since she had noticed similar tendency at beginning of school year, but it had not become accentuated until fall of 1918, when, after six weeks of school, the speech disturbance
At the time of preliminary examination, the child was described as a girl of thirteen years, well developed physically, appearing to be of normal height, but slightly under weight. She showed signs of excessive nervousness, in speech and movements, being quick and jerky or "awkward" in bodily movements. A tendency to sulkiness, stubbornness and pouting was evidence in the facial expression, and a decided wilfullness was apparent.

The pubic change had not occurred, nor had parents felt it necessary to consult a physician in regard to the child.

The speech was that of a stutterer in the initial stages, there being slight involvement of the facial muscles, but particularly a fluttering of the eyelids, and marked respiratory disturbance during speech, with some outward signs.

The report of physical examination given by Dr. C. G. Field of the University Hospital Staff, January 20, 1919, was as follows: "Eyes, apparently normal; teeth in good condition. Tonsils very large, and slightly diseased. No goitre. Blood pressure is 120 systolic and 70 diastolic. Heart and lungs apparently normal. Abdomen of normal contour and there is no tenderness of tumors. Arms are strong and there is no tremor or ataxia. Legs normal, reflexes and sensations normal. Wasserman test negative."
The parents reported that the child had received no recent medical treatment, the last being an examination by a physician in the town nearest home. This physician had noted the enlarged tonsils, but believed that they were not diseased and that no operation was necessary. Parents could not recall when examination was made.

Dr. R. H. Sylvester first examined the child, in January, 1918, when on a trip to Grinnell. He reported "overstressed nerves, good health, need of physical upbuilding, and exercises to improve respiration during speech. The speech,- stammering. Binet age 11yrs.5mos. Chronological age 12 yrs. 8 mos. Intelligence quotient 90.

"Intense interest in play.

"Gets nervous in examinations.

"Hereditary speech defect on mother's side. "
"Speech difficulty in the initial stages. Recommendations; " A one session school program, and special gymnastic and speech training. "

According to the Terman Revision, given by Miss Vest of the Research Station, the child when tested January 11, 1919, at the chronological age of 13yrs. and 7 months, tested Terman age, 14 years and 8 months, with an intelligence quotient of 108.

Tests for imagery given by Miss Lora Hadley of the Research Station, covering visual and auditory memory revealed no marked defect in imagery. The memory span for numbers in correct order was eight; for numbers backwards, five. As most of these tests could be performed
without the necessity of speech, the evidence is not conclusive, in the opinion of the writer, who believes that further tests requiring the use of visual and auditory memory in speech, would reveal defect in imagery.

In tests for imagination, given by Miss Vest, the girl failed in interpretations of pictures. The inability to reproduce short stories and to recount various daily incidents, together with an intense dislike for even making an attempt, or for any exercise calling for reproduction from imagination, was probably due to the stutterer's inhibitions and fear of failure.

The case was diagnosed by the writer as stuttering, due to functional disturbance. The speech was characterized by excessive rapidity and lack of rhythm. There was interference with the normal respiratory function during speech, the hypertonicity being communicated often to the eyes, or facial muscles and diaphragm.

It is evident that the stuttering could not have been in the initial stages as reported by Dr. Sylvester above, since it had occurred at intervals for several years. The statement regarding health also needs qualification, as the child has shown nervousness for some time, and parents report having been warned by family physician against over-stimulation.
Her posture was poor, there being a noticeably flat chest, round shoulders and nervous movements. The age of the child was felt to be an important factor, as puberty was approaching.

The specific stuttering difficulties were on the production of the following sounds; consonants p, b, m, (labials), f, v, (labio-dentals), k, g, (back-tongue sounds), l, r, n, (tip of tongue sounds), w and y used as vowels, in initial position. There were frequent interruptions in the middle of a word or phrase, with attempt to speak on an inspiration. There was greater difficulty with the surds than with the sonants apparently. The difficult consonants were given in an explosive manner showing incoordination of the respiratory and vocal muscles, so that forced expiration occurred before the vocal cords were closed to produce the sound.

The defect was less noticeable when the child was required to speak slowly and distinctly. The child was found to be a highly-strung, over-stimulated girl of nervous temperament, excitable and lacking in nervous control.

The fundamental speech problems were (1), to eliminate the speech difficulties on the above sounds, and to secure normal control of the respiratory mechanism during speech. (2), to improve the physical condition of the child thru adequate medical and hygienic measures.
The specific fundamental problems then, in summary, were (1), the elimination of the stuttering difficulties, (2), Physical upbuilding, (3) diet supervision, (4) control of environmental conditions.

The prognosis was as follows; The onset of the stuttering attack in September, 1918, having been at the beginning of the school year, it seemed that a change of environment, with a specially arranged school program, including gymnastics and speech training, offered favorable chances for improvement. An unfavorable circumstance was the probable inheritance of a nervous temperament and predisposition toward stuttering, on the maternal side. While the child would probably not directly inherit stuttering, as a speech disturbance, she might inherit the emotional instability and nervousness which are important factors in producing a stuttering habit. The time element was uncertain, but it was thought that several months would be required for the process.

The recommendations of the writer were, that the child should be brought to Iowa City, and placed in the home recommended by Dr. Sylvester, in care of a woman experienced in the care of children, and with some training in the care of special cases. It was further recommended that she be under the direction of the writer, in connection with the other workers of the Research Station, for special training in speech, and for diet supervision, until such time as it should seem wise for her to return home.
Training was begun January 7th, 1919, the parents bringing the child to the city, and offering fullest possible cooperation in any way that might be suggested to them. The first step in treatment was accomplished when the child was placed in a new environment. She was under partially controlled conditions as to school program, daily program, rest, recreation, diet, speech. Her diet was arranged by the food expert at the Research Station, Dr. Amy Daniels. At the outset there was considerable difficulty over the food plan, the child having been overindulged in sweets, and highly seasoned foods, caring for practically no vegetables or greens, for few fruits or soups, and many other foods of nutritional value. During the process of treatment there was apparently a close relationship between her lapses of speech, loss of appetite, and weight, and emotional disturbances.

Between January 7th and June 1st, 1919, she made a gain of ten pounds in weight, starting at 89 pounds and advancing to 99 pounds, the average for girls her age and height, according to the weight scale prepared by the Child Health Organization of New York City. She also acquired a liking for many foods which she had hitherto refused, and there was a noticeable increase in her appetite and enjoyment of diet.

The child was enrolled in the public schools, taking selected courses in the eighth grade, consisting of four gymnasium periods per week, domestic science including cooking and sewing, grammar and arithmetic review. The afternoon was devoted to rest, speech training and recreation.
A drop in weight occurred in three instances as shown on the chart, in each case it being accompanied by an emotional disturbance of marked intensity. The first, April 4th, came after a quarrel with a relative; the second, April 25th, after a home trip and consequent excitement; the third, June 4th, when the child already disturbed by the prospect of the trip home, for the summer, was still further excited by the delay in leaving Iowa City. Her weight at the time of her going home, June 11th, was 98 1/4 lbs, a gain of 8 3/4 lbs. over her weight at the beginning of treatment, January 7th. Her weight after return home was reported by the mother as dropping to 95 1/4 pounds, July 25th, a loss of three pounds. This might be explained partially by a difference in scales, and by usual drop in weight in midsummer.

Not only did the child sustain a loss in weight, but at each period of emotional disturbance as indicated, there was a lapse in speech control. This is evident on the speech chart in only one instance, April 24th, when there seemed to be a complete lapse into former stuttering habits. In the remaining two instances the child took unusual care to speak slowly and distinctly in making the speech record. The disturbance in speech was plainly evident however, for several days (about Apr. 4th and June 4th) in outside activities, at home, and with her associates. Although habits of distinct, clear-cut utterance and breath control had been mastered so that good speech was the result under ordinary circumstances,
and were used in conversation with the writer, and the making of her records, the emotional disturbances were of sufficient intensity to counteract the new habit, and throw her back into her habits of stuttering in the presence of others, in home, school and playground relations, so long as the functional disturbance persisted.

The daily program, method of training, description of materials used and analysis into vowel and consonant sounds has already been given in detail in the study of Case I. The methods in Case II. were in general the same, although varied to meet individual needs: The diet plan, weight curve and analysis of phonographic speech records are here given.
Daily Program for N. K.
Adopted Jan, 1919 and followed to June 10, 1919, with a few minor changes.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00</td>
<td>Rise; bathe, dress rapidly.</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Rise at 8:30</td>
</tr>
<tr>
<td>7:45</td>
<td>Breakfast</td>
<td>Brush teeth.</td>
<td>Toilet.</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
</tr>
<tr>
<td>10:30</td>
<td>Study</td>
<td>Arithmetic.</td>
<td>Arithmetic.</td>
<td>Study</td>
<td>Study</td>
<td>Lesson w. Miss J.</td>
<td></td>
</tr>
<tr>
<td>10:50</td>
<td>Cooking/</td>
<td>Lunch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12:00</td>
<td>Lunch, after diet schedule.</td>
<td>Lunch</td>
<td>Lunch</td>
<td>Lunch</td>
<td>Lunch</td>
<td>Lunch</td>
<td>Lunch</td>
</tr>
</tbody>
</table>
# Program for N. K.

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>12:30</td>
<td>Rest</td>
<td>Rest</td>
<td>Rest</td>
<td>Rest</td>
<td>Rest</td>
<td>Rest</td>
<td>Rest</td>
</tr>
<tr>
<td>1:30</td>
<td>Lesson w. Miss B.</td>
<td>Lesson w. Miss B.</td>
<td>Dinner</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2:15</td>
<td>Speech Training Class.</td>
<td>Sp. Tr. Class.</td>
<td>Rest</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3:00</td>
<td>Lesson w. Miss B.</td>
<td>Walk or outdoor exercise.</td>
<td>Walk or play.</td>
<td>Walk or play.</td>
<td>Walk or play.</td>
<td>Play</td>
<td></td>
</tr>
<tr>
<td>4:00</td>
<td>Play.</td>
<td>Play</td>
<td>Play</td>
<td>Quiet hour</td>
<td>Play</td>
<td>Play</td>
<td>Play</td>
</tr>
<tr>
<td>5:00</td>
<td>Quiet hr.</td>
<td>Quiet hour</td>
<td>Quiet.</td>
<td>Quiet.</td>
<td>Quiet.</td>
<td>Quiet.</td>
<td>Quiet</td>
</tr>
<tr>
<td>6:00</td>
<td>Dinner.</td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
<td>Same.</td>
<td>Supper</td>
</tr>
</tbody>
</table>

**Evenings.**

6:30 Help with the dinner dishes.

7:00 Games. 
7:45 Retire.

## General directions.

A cold sponge bath each day, and hot bath at least once a week.

Eat according to meals prepared following diet schedule.

No entertainments or movies during school week, in evenings, but may attend in late P. M.

Evening programs must be attended only Saturdays or Sundays.

Sleep with open window. Practice reading aloud to yourself, slowly and distinctly.

Watch your program and keep appointments promptly.

See Miss S. at any time when anything is troubling you and feel free to tell her of it.
Diet Suggestions.

Dr. Amy. Daniels.
Research Station.

Meals should include 3 glasses of milk per day.
1 egg per day in some form.
Vegetables and fruit. (See other diet plan for G. P.)
Well cooked cereals (as an aid against constipation.)
Graham bread and fruit and vegetables for this purpose.
Peas and beans well cooked.
No tea or coffee. Little cocoa (has been having excess amount of cocoa at home).

A meal containing meat, potato, bread and butter is inadequate.
Use potatoes and some meat occasionally, but stress fruit and vegetables.

If constipation does not yield to diet plan, try a glass of hot water (before breakfast), containing a little salt.

(Although the above diet schedule was carefully followed, not until early in May were regular toilet habits established, with disappearance of constipation).
<table>
<thead>
<tr>
<th>Record Date</th>
<th>No. of Words</th>
<th>Time Used</th>
<th>Ultimate Time After Training</th>
<th>Errors</th>
<th>Diff.</th>
<th>Total No. of Sounds</th>
<th>New Diff. Errors</th>
<th>Reappearing Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/ Jan. 10, 155</td>
<td>58</td>
<td>74 sec.</td>
<td>y, l, n, s, k, f, h. Vowels o &amp; e. Comb. cr.</td>
<td>10</td>
<td>14</td>
<td>0</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>II. Jan. 24, 155</td>
<td>69</td>
<td>74 sec.</td>
<td>w, v, h, f. Comb, sn, sh. 2 errors by articulation.</td>
<td>6</td>
<td>9</td>
<td>y, l, n, w, v, s, k, o, sn, sh. e, cr.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>III. Feb. 7, 99</td>
<td>74 sec.</td>
<td>57 sec.</td>
<td>d(4), g(2). 4</td>
<td>10 v, h, f, d, g, b, b &amp; w. 2 errors by haste.</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV. Feb. 22, 99</td>
<td>57 sec.</td>
<td>0 (slight haste)</td>
<td>0</td>
<td>0 all</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V. Mar. 7, 108</td>
<td>82 sec.</td>
<td>61 sec.</td>
<td>t and l</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>t</td>
</tr>
</tbody>
</table>

Table V.

Phonographic Speech Records for N. K. Jan. 10 to June 10, 1919.
<table>
<thead>
<tr>
<th>Record</th>
<th>Date</th>
<th>No. of words, Used</th>
<th>Time, Used</th>
<th>Ultimate time after training</th>
<th>Errors</th>
<th>Diff.</th>
<th>Total sounds</th>
<th>Elim. diff.</th>
<th>Errors New appearing</th>
<th>Errors reappearing</th>
</tr>
</thead>
<tbody>
<tr>
<td>VI.</td>
<td>Mar. 21</td>
<td>108 77</td>
<td>61 sec.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>all 0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>VII.</td>
<td>Apr. 15</td>
<td>166 61</td>
<td>72 sec.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>all 0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>VIII.</td>
<td>Apr. 26</td>
<td>166 83</td>
<td>72 sec. d &amp; w</td>
<td>2</td>
<td>2</td>
<td></td>
<td>d &amp; w</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IX.</td>
<td>May 16</td>
<td>71 35</td>
<td>32 sec.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>all 0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>X.</td>
<td>May 30</td>
<td>198 76</td>
<td>72 sec. n &amp; y</td>
<td>2</td>
<td>2</td>
<td></td>
<td>n &amp; y</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(N. K.)
Phonographic Speech Record of N.K.
January 10th to May 30th, 1919.

<table>
<thead>
<tr>
<th>Date</th>
<th>Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 10th</td>
<td>14</td>
</tr>
<tr>
<td>January 24th</td>
<td>9</td>
</tr>
<tr>
<td>February 7th</td>
<td>10</td>
</tr>
<tr>
<td>February 22nd</td>
<td>0</td>
</tr>
<tr>
<td>March 7th</td>
<td>2</td>
</tr>
<tr>
<td>March 21st</td>
<td>0</td>
</tr>
<tr>
<td>April 15th</td>
<td>0</td>
</tr>
<tr>
<td>April 24th</td>
<td>2</td>
</tr>
<tr>
<td>May 17th</td>
<td>0</td>
</tr>
<tr>
<td>May 30th</td>
<td>0</td>
</tr>
</tbody>
</table>
Chart III. Curve for Phonographic Speech Record of N. K.


The State University of Iowa

--- shows normal progress in speech improvement.

--- shows disturbance in speech due to emotional change.
Weight of N.K.

<table>
<thead>
<tr>
<th>Date</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 7th</td>
<td>89-1/2 lbs.</td>
</tr>
<tr>
<td>February 14th</td>
<td>92-1/4</td>
</tr>
<tr>
<td>March 15th</td>
<td>93-3/4</td>
</tr>
<tr>
<td>March 25th</td>
<td>96</td>
</tr>
<tr>
<td>April 4th</td>
<td>93-1/8</td>
</tr>
<tr>
<td>April 14th</td>
<td>95-7/8</td>
</tr>
<tr>
<td>April 25th</td>
<td>95-1/4</td>
</tr>
<tr>
<td>May 6th</td>
<td>97-3/4</td>
</tr>
<tr>
<td>May 13th</td>
<td>98</td>
</tr>
<tr>
<td>May 20th</td>
<td>99</td>
</tr>
<tr>
<td>May 27th</td>
<td>97</td>
</tr>
<tr>
<td>June 4th</td>
<td>97</td>
</tr>
<tr>
<td>June 11th</td>
<td>98-1/4</td>
</tr>
</tbody>
</table>
Chart IV. Weight Curve for N. K. Jan. 7, to June 10, 1919.

No. of Lbs.

89 90 91 92 93 94 95 96 97 98 99 100 101 102


--- One session of school.
----- Emotional disturbance.
SUMMARY.
I. In contrast to the stutterer of morbid, introspective tendencies, we have in this case the child of an excitable, emotional type, with excess irritability and restlessness, possessed of good mentality.

II. For this type of child one must restore equilibrium by quieting the nerves, exercising calm, firm discipline over her activities, regulating the diet, rest, exercise, play and hygiene. A sedative for over-stimulation must be applied.

III. Change of environment is equally essential in both cases, as parents have allowed both children to develop a psychosis, and are therefore usually unable to exercise the necessary physical and mental orthogenics.

IV. Three distinct periods of emotional disturbance during the interim from the beginning to the close of training were evident, and each was accompanied by a marked speech disturbance and loss of weight.

V. With this child, the principal speech difficulties, due to lack of breath control and nervousness involved many initial consonants and attempts to speak on inspiration. These were largely overcome by;

(a). Establishment of normal habits of breath control in speech
(b). Vowel and consonant drill;
(c). Transfer of attention from habitual faults to clear-cut, distinct utterance under all circumstances.
VI. The phonographic records show a variation during a month and a half of training, of from 14 to 9 errors, in the first three records. For the remaining three and a half months, perfect records were made with the exception of two errors each in the fifth and eighth records.

VII. Frequent home journeys, disturbances caused by written messages, and constant visits by parents impede progress toward normal speech. The various lapses in speech and rate of progress in this case were determined by influences of this nature. These factors might have been eliminated at the outset, had the child been placed in a cottage under direct control and supervision of the Research Station, where diet, rest, parental visits and outside distractions could have been under absolute, instead of relative control. This case clearly illustrates the urgent need of an observation home where children may be placed under controlled conditions. Only in this way may the maximum success be attained.

VIII. The importance of training and the value of change of environment are evident from parental report of child's continued progress after the return home. The wisdom of continued treatment and controlled conditions having been suggested to the parents, the latter placed the child in a private school for girls, in the fall of 1919, where diet, study, exercise, gymnasium work, hygiene, and general discipline of a desirable type, might be continued, while the child was pursuing a regular Freshman high school course.
CONCLUSIONS

I. The data obtained at the University Elementary School and from 400 additional cases examined indicate that negligent speech habits and imperfect articulation are prevalent and may be corrected.

II. Inaccuracies of speech are caused by:
   A. Organic defects.
   B. Pathological conditions of the nose and throat.
   C. General physical disability which underlies functional disorders.
   D. Predisposition toward a neurosis, which may be induced by apparently insignificant cause.
   E. Imitation of faulty speech.

III. Mental and physical hygiene may prevent the continuation of speech defects.

IV. That speech defects are psycho-physical in nature, must be recognized in diagnosis.

V. The training of the speech muscles to assume the correct positions should be begun in early childhood as such training assists in the formation of correct habits of speech:
   A. By establishing right habits of breathing,
   B. By correcting inaccuracies of speech,
   C. By training the ear and the eye to assist the speech mechanism thru the formation of correct auditory and visual images of the vowel and consonant sounds neces-
sary for word building and sentence structure,

D. By increasing the natural resonance of the voice thru the establishment of clear, distinct, well modulated tones,

E. By eliminating abnormal or pathological conditions which interfere with the child's acquirement of normal, spontaneous speech.

VI. The correction of speech defects involves the removal of physical defects, physical upbuilding, vocal training, mental and orthogenic treatment.

VII. Speech corrections most favorable in children of normal mentality. With mentally deficient children, speech may be improved but the acquirement of normal speech is doubtful.

VIII. In a detailed study of two type cases are illustrated a boy with morbid, introspective tendencies, mentally retarded, and physically sub-normal, and a girl of the excitable, emotional type with excess irritability and restlessness, possessed of good mentality.

A. Restoration of normal speech in first case depends upon physical upbuilding, diet supervision, normal social relationships, rest, relaxation, hygiene and speech training with development of self-confidence.

B. Restoration of normal speech in second case depends upon restoration of equilibrium by quieting the nerves, exercising calm, firm discipline over her activities, regulating the diet, rest, exercise, play and hygiene, applying a seditive for over-stiumula-
tion.

C. Change of environment is equally essential in both cases as parents have allowed both children to develop a psychosis.

D. Consecutive phonographic records including use of all consonants in initial position, and difficult vowel sounds, for each case for a period of from six to eight months, show that the errors for the boy (Type Case I.) were reduced from 15 to 2, and for the girl (Type Case II), from 14 to 0. Both were materially improved in self-expression and spontaneous speech, but each tended to lapse under strong emotional stress.

IX. A home under the direction of the Research Station and the University Hospital Staff, is an urgent necessity, that every child received for treatment or training in speech, may be under controlled conditions.

X. Physical upbuilding alone will not remove speech difficulties nor restore normal speech; the removal of physical defects and pathological conditions must be followed up with intensive speech training, covering a period varying from one month to a year, according to the nature of the case.
Chart V. Exercises for Vowel Drill.

Chart VI. Exercises for Consonant Attack.
Used chiefly for stuttering.
Chart VII. Exercises for developing inflection.

Chart VIII. Exercises for speech building. Used in stimulating spontaneous speech.

Exercises in Phrase Linking. Used in working for smooth, rhythmical speech.
Chart IX. Exercises used for vowel drill on the rounded vowel sounds O, OO, and diphthong EOO.

<table>
<thead>
<tr>
<th>Initial</th>
<th>Final</th>
<th>Middle</th>
</tr>
</thead>
<tbody>
<tr>
<td>meat-name</td>
<td>aim-fine</td>
<td>amaze-sense</td>
</tr>
<tr>
<td>make-nine</td>
<td>hum-moon</td>
<td>dreamer-any</td>
</tr>
<tr>
<td>my-not</td>
<td>comb-can</td>
<td>summer-money</td>
</tr>
<tr>
<td>must-need</td>
<td>foam-seen</td>
<td>tramp-sooner</td>
</tr>
<tr>
<td>move-number</td>
<td>hem-ton</td>
<td>hammer-dinner</td>
</tr>
</tbody>
</table>

-The murmur of music makes him calm.
-The murmuring pines and the hemlocks.
-To him, money seems most important.
-Count out nine new coins.
-John ate his dinner by the fountain.
-The negro nurse crooned an ancient melody.

Chart X. Specimen chart using M, N in initial, middle and final position in words and sentences. Similar charts are used for all the consonants.
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