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WITH DETAILS OF TWO INTERESTING CASES.

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APHASIA.

WITH DETAILS OF TWO INTERESTING CASES.

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When Gall, in the early part of this century, promulgated the idea that certain intellectual gifts were located in specified portions of the brain, he at the same time laid the foundation of a great system of speculation and fraud, and gave the first impulse to a course of study, which, many years later, was to lead to results the most interesting in anthropological science. These two, the system of deception on the one hand, and the most careful deductions of physiological and psychological studies on the other, have diverged in an opposite direction from the ideas of Gall. The one has intensified the idea of localization of the most composite and highly special intellectual attainments, the other has sought to reduce the apparently most simple mental attributes into more elementary states, and only for the latter has accepted, in its narrowest sense, the idea of localization. I can not perhaps better illustrate the meaning of the latter statement than by mentioning in what manner we may speak of the localization of an intellectual gift which directly interests us here, and the study of whose localization has interested the profession at large more fully than any other cerebral function, I mean the faculty of speech. At first glance this seems to be a very simple cerebral function, but the disintegrating power of disease has demonstrated that it is really very composite. It comprises a number of elementary parts of which disease may rob us of one or more and leave others intact. Of these we may speak of the acoustic and visual word image, the motor image for the spoken or written word, and the intellectual interpretation of the word, all of which have different anatomical seats as we will see later. Then, with Kussmaul(1) we may speak of a central organ of speech composed of a large number of ganglion apparatuses, connected by means of numerous tracts, and fulfilling certain intellectual sensory and motor functions.

This central organ of speech is in the vicinity of the island of Reil, and every part of it is closely united with the other parts through a great system of associative fibres, termed the fasciculus uncinatus.

As already indicated the proof of the correctness of these statements is acquired from the study of certain pathological conditions, conditions which it is the object of this paper to investigate.

I wish to treat of those peculiar disturbances of speach usually termed aphasia, and, as briefly as possible, give something of our present knowledge of that subject.

In order to bring out clearly what is meant by aphasia we will first mention some disturbances of speech not properly belonging here. In many cases of paralysis, especially right hemiplegia there is a degree of indistinctness of articulation.

In glosso-labial paralysis this becomes so excessive that words can not be understood, or articulation is altogether impossible. In these cases the trouble is peripheral. The connection between the apparatus of speech and its central organ is interrupted. The muscles do not obey the behests of the will; they are paralyzed. The movements of the tongue, the lips, the palate or other parts are impaired, and there is, therefore, indistinct articulation.

In these conditions the word, as an organic intellectualized entity, is unaffected. It is present in the sensorial regions of the cortex, and the motor regions of the cortex properly exert their specific energizing influence to produce the normally co-ordinated motor act. But the channels between the center and the periphery are injured, and disturbances of articulation ensue.

In aphasia the word itself, and not merely its articulation, is at fault. In what manner it is at fault it will now be our special study to investigate.

The general disturbances of speech termed aphasia are usually divided into several divisions.

Probably the most scientific classification is into motor or ataxic and sensorial aphasia, the first including all those disturbances where the word can not be reproduced as a motor act; the second, where there is an affection of the sensory or perceptive centers, and the word is forgotten or is not understood. But the classification which has been generally adopted, and which will therefore be followed here, is into ataxic and amnestic aphasia, to which will be added a description of conditions only more recently understood, termed

1. Kussmaul, Disturbances of Speech Ziemssen's Cyclopedia.

word deafness and word blindness, or verbal sourdity and verbal cecity. It is well to note that the different forms of aphasia are frequently blended in the individual case.

In ataxic aphasia the difficulty is in the motor area of the cortical center of speech. The words are present in the mind, their meaning clearly understood, but they can not be spoken. At the same time the movements of the organs of articulation need not be impaired. The lips, the tongue, the vocal cords, etc., may perform all ordinary movements with ease. But the co-ordinated movements of these and other parts requisite for the pronounciation of a word are no longer possible.

The occurrence of such conditions will be better understood after analyzing the complexity of movements wherein the motor part of speech consists. Every movement of the tongue, lips or any other part of the body indicates not only muscular activity, but also the activity of a co-ordinating center. When an inarticulate sound is produced a still higher co-ordinating center is called into activity, a center presiding over those which control the individual movements of the lips tongue larynx, chest, etc. But in the utterance of a word the highest co-ordinating center of this order is called into play. It arouses and controls a number of inferior centers. If it be at fault, these centres, though functioning normally in themselves, do not properly act together, and a word is not produced.

These lower co-ordinating centers are doubtless in the subcortical gray matter, for the different muscular movements and even inarticulate sounds can be evoked in animals when the hemispheres have been removed. But pathological observations in man have shown that the co-ordinating center for the production of words is situated in the cortex.

Thus it can easily be understood how the enunciation of words may be impossible while all the peripheral articulatory apparatus is intact.(2)

We will now proceed with the description of *ataxic aphasia*. As before stated the words are present in the mind, but they can not be spoken. The aphasia may be complete, so that not an articulate sound can be utttered, but usually some sounds or words are retained. There may be only a jargon consisting of mutillated words or syllables, or a few monosyllables as yes, no. Sometimes larger words or entire phrases can be spoken. (3) When robbed of all ordinary speech the aphasic not uncommonly finds words in moments of excitement. But words then expressed have as a rule only value as exclamations. At such times oaths are frequently uttered. The nervous arrangements for such expressions are, as Hughlings Jackson, puts it, more strongly organized than ordinary speech. But words spoken in this way can usually not be repeated when the patient is requested to do so.(4)

Such patients can generally communicate their thoughts to others in other ways, by means of gestures, and sometimes in writing. They may or may not be able to write. The latter condition is termed *agraphia*. Where writing is impaired the ability to write ones own name is usually longest retained. The fact that the thoughts can sometimes be expressed in writing when speech is entirely lost(5) proves the motor areas in the cortex for the written and spoken word must be distinct; but they must at the same time be closely united as, in the great majority of cases of ataxic aphasia writing, as well as speaking, is affected. Far less frequently patients lose the power of expressing their thoughts in gestures also (*aminia*).

In *amnestic aphasia* the motor functions are normal but the word is forgotten. In severe cases the word is entirely lost; in the lighter ones the link connecting the idea and the corresponding word seems to be temporarily broken, but the word can be repeated when spoken by another. (In the ataxic form lost words can not be repeated). The words most frequently forgotten are nouns, especially proper nouns, next pronouns, adjectives and verbs, while prepositions and conjunctives are longest retained.(6) Forgotten nouns are frequently replaced by a paraphrase, for example, instead of

2. Perhaps, as Hughlings Jackson appears to think (Brain, Vol. 1. p. 307) paralysis of some muscles or groups of muscles, is always the basis of ataxia of movement. This question is, possibly, in direct relation with another yet unsettled one whether the so-called motor centers of the cortex are only for the co-ordination of movements or whether they directly cause the contraction of muscles. At least the statement in the paper is, in so far, true, that, in cases of ataxic aphasia there need be no appreciable paralysis.

3. Even when words are retained they often have no "speech value". Patients use them rather as exclamations. Even yes and no in some instances have been uttered whenever there was any effort to speak, or as exclamations, and yet could not be properly used in answering questions.
Hughlings Jackson surmises that the words or phrases still retained in some cases were those last in thought at the onset of the disease.

4. Jackson mentions that some have been supposed to be simulating, or on the road to recovery on account of giving utterance to such expressions.

5. Trousseau (Clinical Medicine, Lecture LXI) Kussmaul and Jolly, (Archiv f. Psychiatrie in Nervenkrankheiter Vol xiii Bd. 2.) give good examples of this kind.

6. According to Kussmaul the noun is more loosely connected with the conception than other parts of speech; for we can think of the object without the name, while the more abstract conceptive symbolized by the verb and particularly the preposition is more intimately bound up with the word. The combinations in the cellular net

"scissors," "that with which one cuts"(Kussmaul). Sometimes words are replaced by others having an altogether different meaning. The spoken words have frequently a sound similar to that of those intended, or they are words in daily use, as hat, knife, etc. This confusion of words (*paraphasia*) may be so great as to make speech entirely unintelligable. The same thing occurs, and even more frequently, in writing, one word being written when another is intended (*paragraphia*). Even in gesture language like errors, though much more rarely, occur; for example, an affirmative nod when a negative is meant. (*paramimia*).

In the lighter grades of amnestic aphasia the loss of words may be so slight as to be overlooked in the casual examination of the physician. In as much as its presence, unless of only temporary duration, is generally indicative of organic lesion, it is often important to determine whether a slight aphasia is or is not present. Asking the patient to give familiar names, which normally are almost never forgotten, such as the months, the days of the week, etc., will often lead to the detection of slight amnestic disturbances.

This is the most common form of aphasia, and is, prognostically, the most favorable. The same cannot be said of the severer forms of amnestic aphasia, where the words are entirely shattered, and cannot be repeated when spoken by another. The latter is, prognostically one of the most unfavorable forms of aphasia.

Those conditions have been termed *word deafness* or *verbal sourdity*, and *word blindness* or *verbal cecity*, where with the entire preservation of hearing and sight, spoken and written words appear to make no distinct impression on the sensorium, and are not understood. The latter condition, verbal cecity, is not rarely found with other forms of aphasia. It is a common cause of inability to read in many aphasics. (7) Verbal sourdity is much rarer and has only recently been described.

As the condition in itself is one of great interest, and in order to make it more clearly understood, I will detail a few cases seen by myself. The first and most interesting was seen in Meynert's Clinic. A woman, who was always talking unintelligibly and appeared to pay no attention to what was said to her, was supposed to be insane and sent to the hospital. On examining her she appeared not to understand anything that was said. That the sense of hearing was not, or, at least, not greatly impaired was proven by the ease, with which her attention could be attracted to different noises. That her intelligence was not at fault was shown by her understanding of gesture language. For instance, she was asked to drink a glass of water standing on the table, a request not at all heeded. But when the glass was placed in her hand and it was indicated by gestures that she should drink it, she did so immediately. The woman talked incessantly. What she said was unintelligible, but she appeared to be unaware that she was not understood, and to believe that she was using proper words to express a definte meaning, the subject matter being probably a description of her condition. Of the endless string of sounds and words, a few could be distinguished, which were repeated over and over again. These were ave maria and a few similar words, which had come to be used (she was a catholic), almost automaticly in her former life. The diagnosis word deafness, caused by lesion of the first temporal convolution, was made and confirmed by the autopsy made a few weeks later. There was softening of the first temporal convolution. In this case there had been no paralytic manifestations during life.

In two other cases I shall mention there was only partial word deafness. Each was seen but once by me, and will necessarily be described very briefly. The first was seen also in Meynert's wards. A young woman was sent to the hospital on the supposition that she was insane. When spoken to she generally paid no attention to what was said. Only when asked her name and place of residence would she give a proper answer. These questions she understood perfectly and always gave them a prompt response, but all else spoken to her appeared to fall unheeded on her ear.

The last case, to which I shall refer, was seen at Guy's Hospital, in Dr. Wilk's ward. A patient with right hemiplegia could speak but one or two monosyllables, so that it was difficult to determine how fully he comprehended what was said. I placed a number of different objects before him, key, knife, pencil, a few pieces of coin, etc. When asked to point to the key, knife, or pencil, he would generally make a mistake, but when the pieces of coin were mentioned he would always point them out correctly. In the first case there was always a doubtful look to be ob-

work of the cortex are perhaps more numerous for the latter than the former and are therefore less easily shattered by disease. Physiologically nouns are more frequently forgotten than other words.

7. Wernicke has given a very interesting and doubtless correct explanation of inability to read in some cases of aphasia. In the uneducated reading is always accompanied by speaking the words, either aloud or in a low tone; and when they are no longer able to make the properly co-ordinated movements of speech, they are also unable to read. In other words, as they can not read aloud, they cannot read at all. (Kussmaul).

served; in the second, he pointed to the objects promptly and with a smiling countenance. Some words were understood and some not. It occurred to me that the names of pieces of coin were best understood, because, as these were objects of deepest interest from children, "the nervous arrangements" for the words were "strongly organized," and therefore not easily shattered by disease.

Marc Dax, in 1836, pointed out that aphasia generally occurred with lesions of the left hemisphere. Bouillaud, a pupil of Gall, believed that the seat of disease was in the frontal lobes, and, 1848, offered a prize of 500 francs to any one who should present a case of complete destruction of both frontal lobes in which there was no affection of speech, a prize which was never taken. Broca, in 1861, declared the third frontal convolution to be essential for articulate speech, and that its injury was followed by aphasia. Seguin collected 260 cases of hemiplegia attended by aphasia, and found that of these 243 were right hemiplegias. It has since been clearly ascertained that when left hemiplegia and aphasia are found together, the individual is almost always left handed. (8) It therefore appears that in the cultivation of speech but one side (9) of the brain is actually engaged, the same being the hemisphere which is most called into play in the finer and more skillful movements of the hands.

As regards the localization of the central organ of speech, I do not wish to enter further into historical details, but state the results gained by the study of accumulated pathological material. Meynert, whose opportunities for observation have been unsurpassed, teaches that the cortical center of speech extends as far as the claustrum, including the posterior part of the third frontal convolution, the island of Reil, the operculum (the inferior portion of the anterior and posterior central convolutions) and part of the temporal and parietal lobes.

Nothnagle, in his valuable work on the regional diagnosis of diseases of the brain, published in 1880, has analyzed all the published cases of aphasia from which he draws the following conclusions:

Aphasia indicates disease of the cortex. This is not universally true, but the exceptions are so rare that the above may be accepted as a rule. (10).

In the ataxic aphasia the third frontal convolution, or the island of Reil, most frequently the former, are generally affected.

In amnestic aphasia the same parts are frequently affected, but not infrequently the lesion is found in parts of the cortex lying more posteriorly.

Word deafness points with greatest probability, to affection of the temporal lobe, especially the first temporal convolution.

With the demonstration of the composite character of speech afforded by the above studies allow me to mention a few reported cases in which, from the destruction of some and retention of other parts of the central apparatus, a singular and interesting spectacle is presented.

Herz (Kussmaul) reported a case of aphasia where the patient could read aloud, but could repeat only a few spoken words. Here there was a hiatus somewhere between the acoustic word image and the motor center of speech, while between the visual word image and the motor center every part was normal.

A patient of Broadbent's (Brain Vol. 1), could speak fluently, but could not name any object held before him. He could write from dictation, but could not understand what he saw written. Here there was a hiatus on the one hand between the retinal image of the object and the "naming center," on the other, between the retinal image of the written word and the center for its interpretation. On *post mortem* examination a softening of the *centrum ovale* immediately subjacent to the angular gyrus was found. This, according to Ferrier, is the most important part of the cortical visual center.

A last instance I shall relate is a very remakable one reported by Westphal (Kussmaul). The patient could write from dictation, but immediately afterward did not understand the written words. But he could recall their meaning by a singular

8. Hughling Jackson (Brain Vol. ii p.) refers to a case of left hemiplegia and aphasia in a right handed individual. This is the only case of the kind with which I am acquainted.

9. Hughlings Jackson, in a series of valuable articles on "Affection's of Speech from disease of the Brain" (Brain Vol. 1. ii), in which he aims to establish the study of mental diseases upon a more scientific basis, assumes that in the understanding of words both hemispheres are employed. But this hypothesis does not appear to be in harmony with the production of word deafness by lesions of one temporal lobe.

The idea, pervading this article, that aphasia is due to dissolution (in opposition to evolution) of speech, though strongly sustained by many features of aphasia, and even more strongly by some other pathological conditions, is, perhaps, too prominently dwelt upon as the mode of development of aphasia. For the deep and circumscribed lesions, upon which aphasia usually depends, appear, generally, to cause disintegration rather than dissolution of speech, the loss of a certain part, rather than reduction to a lower level.

10. Through pressure, reflex action etc., cerebral lesions often produce symptoms from parts of the brain not directly injured. This probably accounts for those rare cases of aphasia where there are only subcortical lesions (the destruction of communicating fibres is sometimes to be taken into consideration), and those, occurring more frequently, where the cortical lesion is not in the part most frequently affected when certain forms of aphasia are found.

stratagem, that is by passing his finger over the letters of a word, as in the act of writing. Here there was word blindness, but there appeared to be a reverse current from the motor center for written words to the center for their interpretation.

Aphasia is sometimes of transient duration, occurring in the course of hysteria, chorea, epilepsy, &c. In such case there is, perhaps, a temporary enfeeblement of the speech center. But when the aphasia is permanent it is one of the most certain symptoms of organic lesion. But even with cerebral lesion the affection of speech is some times only temporary, in other words is curable. Kussmaul states that recovery is more probable in the young than in those more advanced in life, and also in those who normally manifest the greatest readiness in learning. Gymnastic exercises in articulation and speech some times hastens recovery. The prognosis is usually the more favorable the shorter the duration of the affection.

Recovery, where a part of the center of speech has been destroyed, can only be explained by another part of the cortex in the same, or the corresponding part of the other hemisphere, assuming the function of the part destroyed.

In this connection I beg leave to mention a case, the most interesting of its kind with which I am aquainted, seen with Dr. Althaus at the hospital for paralyzed and epileptics. This was a woman who, fourteen years previously, has had an attack of right hemiplegia, and almost complete aphasia. When she came under Dr. H's observation one year before I saw her, she could only pronounce a few monosyllables, and there was paralysis with rigidity of muscles on the right side of the body. At that time applications of the Galvanic current to the neighborhood of the left island region were given daily. When I saw her the hemiplegia was very much diminished, there was only slight rigidity of muscles and the speech was nearly normal. Whether or not these changes were greatly influenced by the electrical applications the improvent of speech and of the paralyzed limbs, after such long duration of the malady, was almost marvellous. To state whether the recovery of speech was due to the functioning of new areas in the same on the opposite hemisphere would be premature.

This paper has already become so long that I hesitate to add more. But the consideration of our subject in one other aspect is practically so important that I cannot omit it. I refer to the mental condition of aphasics. We must consider the effect first of the loss of words, second of the organic disease, upon the mind.

In the purely ataxic aphasia the power of thinking is not impaired by the loss of words, because they are still present in the mind and can be utilized in silent thought.

What would be the effect of uncomplicated word deafness, a condition rarely found, is difficult to say. For it is impossible to know to what extent words still properly appear in thought.

The influence of amnestic aphasia in mental processes is more apparent. When it is very slight and only a few words are forgotten, their loss may have little apparent influence; but when words are altogether wanting clear and well ordered thinking must be well nigh impossible. I do not wish to discuss the question whether conceptions are or are not altogether dependent on words, but still it is certain that our conceptions and words are most intimately bound together. We have been accustomed to think in words [11]) and when these are taken from us, all precise thinking, except on the most simple relation of things must be impossible ([12]).

But apart from the effect of the loss of words, the direct influcnce of the cerebral lesion is to be considered. Mental impairment is perhaps more frequently due to the cerebral lesion than to the mere loss of words. At least it is certain that the degree of aphasia and mental impairment by no means run parallel with one another. We have said enough to show that the mere presence of aphasia does not determine the mental condition of the patient. To know that it is necessary to make a proper examination in the individual case. Nor is it usually easy to arrive at satisfactory conclusion owing to the difficulty of understanding the aphasic subject, his manner of communicating his ideas being either through mutilated speech, writing or gestures, though sometimes all of these are at fault. Jolly believes that we are more likely to overrate than underrate his degree of intelligence, exaggerating the value of information gained in such a difficult manner. Be that as it may, we, at least, have instances where patients, almost deprived of speech, are

11. Some mental processes can be carried on without words (Kussmaul). It is a common thing to see great skill in playing games, cards, chess etc., when all orderly thinking in words is impossible, and even in those, otherwise, nearly demented. Trousseau mentions his chagrin' when a student in the Charenton Asylum, at being beaten at chess by an imbecile; and an alienist physician recently told me that he was frequently beaten in the same game by a patient in an advanced stage of general paralysis.

12. Prof. Lordat, of Monpellier, who, after a febrile attack, was entirely deprived of speech for several months, and could not understand anything that was said, declared afterwards that during this time he could think orderly about his condition and even follow out the line of thought of his lectures. Both Trousseau and Kussmaul doubt the entire reliability of Lordat's observations on himself.

still able through communications in gesture language or otherwise, to conduct business affairs very successfully, thus exhibiting a high degree of intelligence (for instance patients mentioned by Broadbent, Trousseau, Jolly).

The medico-legal interest in examining such patients is to determine their testamentary capacity. To do so it is necessary to determine, not only whether there is any impairment of intellect, but also the degree of impairment. For the mere fact that the mental capacity is less than formerly should not be accepted as identical with testamentary incapacity. Physiologically the vigor of intellect decreases as man passes beyond the years of his prime, but one does not speak of testamentary incapacity unless there are decided manifestations of mental decay. So, in our patient, the sudden change caused by a lesion may leave him with lessened capacity and yet the diminution may be of a degree which need not legally incapacitate him. But as there may be many difficulties both in understanding the aphasic subject, and in determining his mental condition, the manner of making the will, as Jolly has suggested, should be such that there would be no doubt of the meaning of the testator, or of his mental capacity. When he is unable to write the will should be made before proper officers and witnesses, an expert being also present when deemed necessary, to testify to the mental condition, every effort being made to understand fully the meaning of the testator.

In conclusion I wish to report two cases somewhat in detail. The first (which I will present to you) is interesting on account of the manner of improvement after complete aphasia, the aphasia being apparently of the purely ataxic form.

M. B.,(13) age 42, about six weeks ago was seized with right hemiplegia and aphasia.

Whether the aphasia came on suddenly or not I am unable to state. When first observed by others there was complete aphasia and partial hemiplegia in the right side. He did not speak at all. In walking it was observed that the right foot swept the floor, and in eating, that the right hand seemed hardly strong enough to raise morsels of food to his mouth.

When I first saw him, about three weeks ago, there was a scarce perceptible dragging of the right foot in walking, the right hand was weaker than the left, though the power of grasp was fair, and there was a decided facial paralysis (muscles supplied by the lower branches of the seventh nerve). The tongue did not deflect when protruded, but the tip could be moved more readily to the left, than the right angle of the mouth. Neither the palate nor any other part of the peripheral articulatory apparatus not already mentioned was appreciably paralyzed There was no anæsthesia.

The patient was unable to articulate any word excepting "yes" and "no." Only once did I succeed in obtaining any other word from him. I asked him which was my right hand. He touched my right hand with his own and said "this." But he could not repeat "this." Repeated "yes" when requested. He only used the words "yes" and "no" in answer to questions; but the latter were more frequently answered only by an affirmative or negative nod (correctly given). He understood what was said to him, also what was written.

I requested him to write his name. After several efforts he succeeded in writing a few letters of his given and surname, in each case beginning with the right letter. But he could not complete his name. He could not write anything else spontaneously. But that the fault was not in the weakness of the muscles of the hand (he wrote with the right hand) was proven by his being able to copy fairly well several sentences I wrote for him. On this specimen, which I show you, you will see how much more distinctly the letters are written where he was only copying, than where he tried to write his own name.

From the time of my first visit the improvement in this patient has been progressive. During a visit about one week after my first I observed that he could name objects, key, knife, etc., also could count from one to ten, and said the alphabet as far as l, with some errors to which I will later refer.

At subsequent visits it was observed that he could speak short sentences correctly, and read still better; but with difficulties to be mentioned immediately. I will first describe his manner of reading and then his speech. The patient always pronounced the words in a very low tone, so that it was necessary to listen closely, in order to understand him. The first words were always most distinct, the subsequent becoming indistinct quite regardless of their structure, that is of the letters or syllables of which they were composed, though monosyllables were always more distinctly spoken than polysyllables. After reading a short time he would suddenly stop as if unable to pronounce the next word.

I requested him to read the following passage

13. A patient at the Cincinnati Hospital. I am indebted to Dr. Jno. A. Murphy for the opportunity of presenting him to the Academy.

from the newspaper, "There are but few readers of American newspapers who have not read," etc. The first few words were read with tolerable distinctiveness, but "American" was pronounced with much difficulty and indistinctly, and he could not utter even the first syllable of "newspaper." I then gave him a much simpler sentence from a child's book, "The old red hen can fly and run * * * fly now, red hen," etc. He could read this better, but similar disturbances were observed. That the difficulty did not lie in the special sound of the words over which he stumbled was easily proven. For the word "newspaper" in the above sentence could be pronounced after he rested awhile; and not only this, but it could be repeated any number of times continuously, the word being now spoken in a bolder, louder tone, the constant repetition giving him an ease and confidence not formerly possessed. In the second sentence the word "red," before which he also made a pause (though a much shorter one) as though it were impossible for him to pronounce it, was selected for like experiment. It was repeated a dozen times or more in the same easy manner. But there was this difference between the repeated utterance of these two words: "red" could be repeated rapidly, but there was a perceptible pause each time before "newspaper" was spoken.

I have entered so fully into this description because I believe it enables us to locate the trouble very exactly. There is no difficulty in the peripheral apparatus. Every sound can be distinctly uttered. The fault is in the central organ, in the co-ordinating center for articulate words. In the beginning this was completely demoralized and no word could be uttered. It has been restored to that extent that any word can be spoken; but it is still weakened so that new combinations can not be rapidly formed.

We have been speaking of the patient's manner of reading; if we carefully observe his spontaneous speech we will find other interesting conditions presented. He names any object correctly; also pronounces very well short sentences, such as "I am well." But if he desires to say anything requiring more elaborate sentences, or more complex thought, he succeeds, perhaps, in saying a word and then is completely at sea.

I believe this inability to express more complex thoughts can be thus explained. In speech the attention must be appropriately divided between the thoughts to be uttered, the choice and arrangement of words and their expression. Ordinarily a scarcely appreciable part of the attention is devoted to the mere expression of words; but in our case, with the weakened co-ordinating center, almost the entire attention must be given to the mere expression, or they cannot be pronounced.(14)

In reading, or in uttering very simple thoughts, as "I am well," this is possible. But in more complex thinking, where both the thought itself and the arrangement of words make a great demand on the attention, so little is left for the mere expression, that, in our patient, words can not be expressed at all.

The improvement in writing corresponds with that of speech. He can write his own name, place of birth (Ireland), and simple sentences, "I am well," etc.; but altogether cannot express himself as well in writing as in articulate speech. But he does not always appreciate this fact as an instance will show. I asked him why he left Ireland. He tried to explain, but could not say a single word. I asked him if he could express his thought in writing and he answered affirmatively. He then took pencil and paper as if prepared to write, but could not trace more than a single letter, and then acknowledged his inability to do more.

The mental condition of the patient is probably little if at all affected. He answers questions well as far as his speech will permit. He reads the daily papers apparently with interest. He does not re-read the same articles, but, as the nurse informs me, seems to read column after column, and when he is through with one paper lays it down and takes another. Two days after he read the paragraph above mentioned I asked him to find for me the same paragraph (without telling him what it was), which he accomplished successfully. Whether the disease may have produced some slight defect of intellect could only be determined after knowing his former mental capacity, and observing his performances and utterances for a length of time.

The paralysis has almost disappeared. Nothing abnormal is observed in his gait. The grasp of the right hand is but very little feebler than that of the left, and the facial paralysis very slight.

Considering the constant and rapid improvement we may hope for a complete restoration of the paralyzed parts, and of speech; but are unable to say anything as to recurrences of the attack.

The diagnosis is probably occlusion of the

14. It has already been mentioned that patient made mistakes in reciting the alphabet. As he appears to be an intelligent man, reads papers with interest etc., it is probable that those mistakes were not due to ignorance nor to loss of memory; but, rather, that the entire attention being given to the mere pronunciation, the mistakes were not observed.

middle cerebral artery at a point beyond the giving off of the basilar branches. Though the differential diagnosis between hemorrhage and occlusion of an artery is very difficult, usually impossible, I believe it can be made in this case with some confidence. The manner of onset, with very slight paralysis of the leg, more in the arm, and most decided in the face, and complete aphasia, points to a lesion nearer the cortex than the ordinary cause of hemiplegia, lesion of the corpus striatum, or in its immediate vicinity. The extent of cortical area represented in the affected parts and the rapidity of the improvement can be explained more easily by occlusion than by rupture of a vessel. There is nothing else in the condition of the patient or his history, so far as known, which throws light on the character of the lesion.

A second case[15] I wish to report (his condition precludes the possibility of presenting him to the Academy) is one of aphasia produced by gunshot wound of the brain. The injury, caused by a pistol ball, was sustained about seven weeks ago. The external wound is one-half inch to the left of the median line, and one and one-fourth inches above the orbital margin of the frontal bone. Dr. Young informed me that the orifice in the bone was in direct correspondence with that in the skin, so that the ball probably traversed the brain in a line perpendicular to the surface at the point of entry.

When I first saw the patient, about two weeks after the injury, there was right hemiplegia and hemianæsthesia. He seemed to understand what was said, but his only articulate utterances were "ha ha," excepting on a few occasions when he said yes and no in answer to questions, which words were repeated in request. But he usually answers questions with "ha ha," sometimes adding an affirmative or negative nod.

When I saw the patient again, about a week later, there was no special change, excepting that his speech consisted of "fuh fuh," instead of "ha ha" as formerly.

I did not see him again for a month, during which time his condition had improved very much. There had been complete hemiplegia. He had at this time regained sufficient power in the right leg to walk with some assistance, but the hand and arm were still entirely powerless. The facial paralysis was less decided. The tendon reflexes were exaggerated. Foot clonus could be obtained on both sides. There was still a degree of hemianæsthesia on the right side, but far less marked than before, being greatest in the upper extremity. The special senses, taste, smell and hearing, in the right side were very much impaired. There was also right hemiopia. The acuity of vision in the left half of the field of vision was $\frac{2}{3}\frac{0}{0}$ in the left, and about $\frac{1}{3}\frac{0}{0}$ in the right eye. The color sense on the same side was normal. On the right side of the field of vision there was complete blindness; but the dividing line was not exactly through the point of fixation. It was a few degrees to the right of the latter, almost vertical, only curving a little to the right at the centre, and was about one-half degree further to the right for the right than for the left eye, so that the field of vision was larger in the eye opposite to the injury.

His speech had improved very much. It was first observed that he could repeat words on request, but with this peculiarity. When told to pronounce a word, for example his own name Gustave, he would pronounce it correctly, if then told to repeat some other word he would say "Gustave" and continue to make this mistake until after a pause of some time. He could now repeat another word, and then would make the same mistake with this as with the preceding word. When I saw him this was no longer so noticeable, but it occurred occasionally.

I requested him to name some objects, book, watch, pencil, etc. He succeeded in some instances, always most easily with names of one syllable. He very soon became weary, so that after naming two or three objects it was impossible to proceed farther. He could also speak spontaneously, told his name, age (twenty-nine). His name had been incorrectly written on a card. When this was pointed out he said, "Yes, that was a mistake." (He always spoke German). Showed him a lead pencil and asked him what it was. He said, "I know well—but—" He repeated these expressions on request. These and other simple sentences, "I don't know," etc., were spoken spontaneously. But the utterance of more complex thoughts was altogether impossible. He would often try to explain something. In such case he would sometimes not succeed in saying a single word; at other times he would pronounce a few words, then a number of unintellible sounds, of which "fuh fuh" formed a principle part, and finally stop suddenly. (He always looked vexed and sad in case of failures, but never uttered any exclamations, while mild oaths were common utterances on such occasions in case of the other patient.)

15. A patient at the Cincinnati Hospital. I am indebted to Dr. D. S. Young for the privilege of reporting this case.

His entire failure to express complex thoughts is not so easily explained as in the other patient. Words are not entirely lost; the associations between them, in their motor and sensory aspects, and the conceptions seem to be, in some manner, disturbed. He succeeds best in the utterance of simple responses, as "I can not," "Good bye," etc., utterances so easily evoked that they might be termed psychic reflexes. Such mental processes are more automatic(16) than in case of more complex thoughts.

But in the latter, which, we may believe, depends upon the activity of the most intricate arrangements of nerve cells and fibres in the highest part of the cortex, the impulse seems to be almost entirely lost before it can result in expressed words. It may be that there is intellectual deficiency quite apart from the loss of words; but his efforts to speak show very clearly that he possesses thoughts, more or less distinctly outlined, which cannot be expressed.

The patient sometimes succeeds in reading and understanding single words. But he cannot read, nor can he understand a written sentence. He can write his own name, age, etc.; he can also write some words from dictation. He writes in a direction from right to left; but he can write in the ordinary manner, though with more difficulty, He can write only with the left hand. He was right handed.

As to the location of the lesion. From the direction of the wound we are justified in believing that the cortical center of speech was not directly injured, that it was either affected indirectly, through pressure, inflammation or the like, or through the destruction of communicating fibres. From the right hemiplegia, and the impairment of both general and special sensibility on the same side we may conclude that the left internal capsule was injured both in its anterior and posterior portion.

One of the most interesting symptoms in connection with the study of localization, is the hemiopia. Some experiments in animals, as well as a few observations in men, lead us to believe that this condition may result from lesions of certain portions of the cortex. But, from the consideration of all the facts in this case, it is probable that the hemiopia is here due to involvement, directly or indirectly, of the left optic tract or its ganglia.

16. Both the terms reflex and automatic, when applied to mental processes, may become very misleading ones, unless it is distinctly understood in what sense they are used. They express degrees, not kinds, of mental activity. Only facility of conveying or receiving impressions, or readiness of responses are implied by these terms.