ON A PARTICULAR FORM OF AMNESIA.

LOSS OF NOUNS.

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ON two previous occasions I have brought before the Society cases of affection of speech with post-mortem examinations, and have endeavoured by their means to elucidate the mechanism of speech and thought.*

The opportunity has just been afforded me of examining the brain of a patient who presented a form of defect of language the importance of which has scarcely been adequately appreciated, the defect consisting in the entire loss of the power of uttering nouns substantive, whether for employment in speech or by way of imitation.

The patient, a gentleman at that time *æt.* 72, was first seen in consultation with Mr. Meehan, of Regent's Park, on September 17th, 1878. On the 12th he had been seized with faintness while sitting in a hot greenhouse in the Botanical Gardens and had for a time entirely lost his

¹ "On the Cerebral Mechanism of Speech and Thought," '*Med.-Chir. Trans.*,' lv, p. 145; "On a Case of Amnesia," *ib.*, lxi, p. 147.

speech. This he partially recovered, while slight hemiplegia of the right side had gradually come on. At the first consultation the precise character and extent of the speech defect could not be defined; there was conspicuous paralysis of the right side of the face, of the kind seen in hemiplegia, a moderate degree of paralysis of the upper extremity, slight paralysis of the lower extremity; with this, marked hemianæsthesia and loss of the sole reflex. The patient was suffering from severe pain in the right temple.

He speedily recovered so far as to be able to go about and to cut up his food with the right hand, and the affection of speech had in November reached the point at which it remained for more than five years, during which time he was continuously under the care of Mr. Meehan, and was carefully watched by intelligent relatives and by a nurse of remarkable power of observation and accuracy of description, whose attention was specially directed to the peculiarity of the speech. I saw him at intervals, and in his final illness, which was an attack of congestion of the lungs.

During the whole of this time he was scarcely ever known to utter a noun substantive, and if he did, it was, so to speak, inadvertently and erroneously. Other words he said unhesitatingly, and he would employ fairly long phrases, speaking them smoothly and naturally so long as a noun did not come in his way. The following are examples: "I am very glad to see you," "I am very much better to-day, thank you," "Oh, yes, very well indeed," "I cannot remember it at all." When he wished for anything he would say "I want the one," "Please give me the one." And the nurse would, by guesses, find out what it was, when he would say, "Yes, that's it, thank you." Asked his age he replied, "I shall be seventy-three on the 3rd—4th"—stopping puzzled and baffled—he meant on the 24th of December. He was always brought to a standstill by a noun, and was at first greatly distressed and confused by his efforts to remember

the word. He was unable to name an object at sight—the hand, or a pen, or the sheet; and not only this, but he could not repeat after me the above words, though he tried hard. Once when endeavouring to say hand he said something like leg. When told to say one, two, three, during the examination of his chest, he did so promptly.

He clearly understood all that was said to him and took a great interest in all that went on in the household. He read his newspaper and often pointed out paragraphs relating to people and places that he knew, showing that he understood it. His memory was said to be remarkably good and accurate. He could sign his name, but could not answer a question in writing.

He was cheerful but emotional, often crying when I first spoke to him and in saying good-bye.

The paralysis entirely disappeared, but the nurse stated that sensation did not appear to be so good on the right as on the left side. The patient did not notice when the right foot slipped from the footstool as it was liable to do.

Such was the condition. The patient died on December 22nd, and the examination was made on the 24th, about forty-eight hours after death.

The cranium was very thick and dense, and the brain apparently somewhat shrunken, but not more on one side than on the other; there was no fluid in the membranes over the hemispheres and not much at the base. Inspected before its removal, nothing abnormal was discovered about the brain; in the act of removing it the membranes and nerves were observed to be very tender and lacerable and the arteries moderately affected with atheroma; the brain substance was soft.

The corpus callosum having given way along the median raphé, the detailed examination was begun by completing the division of this commissure and by removal of the velum interpositum and fornix, the latter being torn. The left thalamus was smaller than the right, but neither on its surface nor on section was any focus of morbid change visible. The anterior rounded extremity of the

left corpus striatum had its natural size and appearance, but as it narrowed, two digital depressions were seen, one just in front of the posterior border of the thalamus, the other a little beyond this body ; there was no discoloration, and nothing was apparent on section at these points but a local loss of substance. The most conspicuous change was in the posterior cornu of the ventricle, where a brownish translucent patch, rather larger than a sixpence, occupied the situation of the calcar avis. A band of white fibres, apparently untouched by degeneration, ran from the thalamus along the inner side of the patch to the tip of the occipital lobe. From the translucent area itself all trace of nervous structures had disappeared, leaving only the pia mater lining the calcarine fissure, and this was not apparently vascular. The comparison between the corresponding part of the two posterior cornua was very striking, the right calcar presenting a smooth white prominence over which ramified a vessel of some size. The descending cornu was large, the fibres along its roof soft and apparently wasted, but the hippocampus with its tænia was in a normal condition.

The right hemisphere was normal in all respects.

In the left hemisphere the convolutions of the convexity everywhere presented a natural appearance. The third frontal and adjacent part or foot of the anterior or ascending frontal gyrus were specially examined on all sides, including the surface within the fissure of Sylvius, and found to be normal.

The Sylvian fissure gaped somewhat and the pia mater over it was thickened. When the insula was exposed it was seen to be unduly smooth. Of its six convolutions the two anterior which dip under the posterior margin of the orbital lobule were in their normal state ; so also was the first of the two outer ones which correspond with the end of the third frontal and the foot of the first ascending gyri ; the more posterior of these was reached but not destroyed by degeneration. The two long convolutions which run from the summit of the insula towards the

posterior extremity of the fissure had entirely disappeared, leaving a smooth surface of a pale fawn colour, formed apparently by the external capsule, itself somewhat degenerated but overlying grey substance of the lenticular nucleus which was not appreciably altered. The angular gyrus round the extremity of the Sylvian fissure and the supra-marginal lobule forming its upper margin posteriorly, were undermined by an extensive area of degeneration continuous with that which had destroyed the posterior insular convolutions. The degeneration, however, did not reach the surface of the gyri presenting on the convexity of the hemisphere, or penetrate very deeply into their white axial fibres.

A series of transverse sections revealed nothing more. Parts of the brain and cranial contents not mentioned may be taken as presenting nothing abnormal.

Before commenting on this case I may relate another, that of a lady æt. 75, seen with the late Dr. Frampton in October and November, 1879.

She had been a little out of sorts on the 12th of October, and on the morning of the 13th mumbled and could not be understood. There was some improvement during the day, but after sleep at night she woke in a state of extraordinary excitement. She was out of bed in a moment and round the room more quickly than she had been for years; she was talking rapidly, but no one could make out what she wanted, which made her very angry.

When I saw her on the 20th she was quiet and rational, ladylike and lively. She understood all that was said, and answered many questions that did not require the use of a noun. She asked anxiously and fluently, "Shall I get better of this . . . ?" trying to complete the sentence, but stopped by her inability to find the noun she required. Other phrases which I took down were, "I hope you will be able to do me good . . . to take this away." She was encouraged to tell her own tale, and spoke distinctly and unhesitatingly, but got confused when she came to a noun. She resented all attempts on the part of her maid to assist

her and told her not to speak. She could not name a watch, the curtains, or Dr. Frampton, and could not tell her age. She was moreover quite unable to read, having up to the moment of the attack been a great novel reader. There was no paralysis of any kind.

At a second visit in November she recognised me and received me in a natural and ladylike way. She said, "Oh yes, I remember you quite well," and used other similar phrases. I sat by her bedside for a quarter of an hour, during most of which she was talking, but except that she once said "thing" and once inappropriately "jealousy," and two or three times "the other day" adverbially she did not employ a single noun substantive. On coming to a noun she bungled and employed some unintelligible substitute.

This lady lived some time, and I understood from Dr. Frampton that the speech did not change, but I did not see her again.

In a third case seen with Dr. Marcus Allen at Brighton, and subsequently in London with Mr. J. Ernest Lane, loss of nouns was a stage in disease which advanced to complete loss of speech and to a rapidly fatal termination.

The extraordinary analysis of language made by disease of the brain in cases such as these will strike anyone who gives the subject a moment's thought. A single "part of speech," the noun substantive, is separated from all the others, and while they can be spoken fluently and appropriately, utterance of nouns of all kinds fails entirely; they do not come for the expression of thoughts or wants, they are not suggested by objects presented to the sight, and they cannot be repeated imitatively. This analysis by disease is all the more remarkable, inasmuch as it corresponds with the analysis of language arrived at by logicians and grammarians. They also place nouns substantive or names apart by themselves, a distinction recognised in German by the capital letter with which they are spelt. Nouns or names are the objective material of thought—the subjects of predication—other parts

of speech are merely a framework in which names are set for comparison or predication.

Again from a physiological as well as from a philological point of view nouns or names stand alone. They only are intellectual symbols properly so-called. As I have attempted to set forth in my former communications they represent the final act of intellectual elaboration of the perceptions derived from the different senses. A complete elementary notion of an external object is a combination of all the perceptions, visual, tactile, &c., and the auditory perception associated with this notion in early childhood is the *name* which thenceforward habitually symbolises the object. A noun raises a mental picture which is not the case with any other word. It belongs, in effect, to the sensory side of language of which it is the highest point, while all other parts of speech imply movement of ideas and may be said to be motor.

In order that the bearings of these considerations and of the case as a whole on the mechanism of speech and thought may be explained, it will be necessary to restate briefly some of the conclusions arrived at in my previous papers, and especially to discuss the exact part played by the third left frontal gyrus in articulate speech. This has been admirably expressed by Dr. Hughlings Jackson in the phrase "the way out for words," or it may be otherwise described as the downward starting-point of language; its function is essentially motor, like that of the cortical motor centres in the region of Rolando, and its cortical cells may be compared to the motor cells in the anterior grey cornua of the spinal cord. These cells, constituting the motor nerve nuclei in the cord, are co-ordinated or grouped for the production of orderly movements through the agency of sensory nerve-cells connected with the posterior nerve roots, and the motor cell groups so formed are then ready for employment, and are employed by higher centres. In the same way, then, as the cells of the anterior grey cornua are grouped or educated by sensory cells on the same level, the cortex of

Broca's convolution will be educated for the utterance of words by the auditory perceptive centre, the superior temporo-sphenoidal gyrus, which is on a level with it anatomically as well as physiologically (being, like it, a marginal convolution), and being educated, *i.e.* its cells being properly grouped, will be employed by higher centres which are the seat of the intellectual operations. Again, just as the integrity of the sensory side of the spinal apparatus is necessary to the functional efficiency of the motor cell groups, and damage to the former, as in locomotor ataxy, gives rise to inco-ordination, so with regard to the auditory perceptive centre and the motor word centre.

But, as has already been said, language has its sensory aspect and its sensory cortical apparatus. I have put forward in previous communications, as a tentative hypothesis based upon observed cases, the supposition that each sense having its perceptive centre in the convolutions identified as such by Dr. Ferrier, the perceptions from these several cortical areas converge, by means of tracts of fibres, upon a higher cortical region in which they are combined and elaborated into an idea which is symbolised by a name. This naming centre or idea centre will be the highest centre on the sensory side of the nervous mechanism, and the corresponding motor centre I have supposed to be a propositionising centre in which the first motor process of language and thought, the mental rehearsal of a phrase, takes place.

Taking these assumptions for a moment as granted, it is conceivable, first, that the paths from the visual and auditory perceptive centres to the naming centre may be destroyed. In case of lesion of the communication between the visual and naming centres the sight of an object would no longer call up the name. Such a case I have related in the first of my papers read before this Society, describing the lesion found after death. A patient, otherwise perfectly intelligent and who conversed fluently, was utterly unable to name an object at sight.

Tested scores of times over a period of many months he never once succeeded in naming such familiar things as a pen, chair, table, hand, coat, or any object whatever. Obviously a man in this condition would be unable to read, and such was the case with the patient; what made it more interesting was that he wrote correctly out of his own head or from dictation, but could not read a single word of what he had himself written.

Such cases have been described as examples of "word-blindness," but this term is altogether inadequate and misleading. The word-blindness is only a part of a wider and more significant deficiency. It is not as words that words cannot be read, but as visual characters or objects which cannot be named.

A corresponding interruption between the auditory perceptive centre and the naming centre will have more striking results. The subject of the lesion will understand nothing that is said to him and he may or may not know what he says to others. Many examples of this condition are on record, and I have narrated such a case, in the paper already referred to, but without post-mortem examination.

The patient was a lady who replied quite inappropriately but in intelligible and connected sentences to questions and observations, and showed that she did not understand what was said to her by failing to do simple things when told.

Again, the naming centre may itself be destroyed, and under the title of a Case of Amnesia I brought before this Society what I believe to have been an example of such a lesion, in which, without any damage to the ascending convolutions of Rolando or to the third left frontal gyrus, but with extensive softening of convolutions behind the motor area in the left hemisphere, a patient was utterly unable to comprehend spoken or written language, and talked incomprehensible gibberish in which not a single word was, as a rule, recognisable; he spoke his inarticulate jargon fluently and with natural emphasis and intona-

tion, and evidently had ideas in his mind which he thought he was expressing.

Returning to the case here related it is supposed to illustrate breach of the communication between the name centre and the propositionising centre. The patient had in his mind ideas and wishes, and rehearsed mentally, and uttered in words, phrases expressive of these ideas and wishes all but the nouns or names. These were not supplied in consequence of the interruption of the tract from the name centre to the propositionising centre.

The lesions found after death are interesting from whatever point of view they may be considered. One reflection suggested is that the exclusive employment of the left hemisphere in the utterance of speech involves its predominant if not exclusive employment in the integration of language in thought. Again, the case illustrates the fact that there may be loss of speech without damage to the third frontal convolution, but shows, at the same time, that the cases in which this occurs are recognisable during life as distinct from aphasia as commonly seen.

Observing upon the lesions *seriatim*, the calcar avis or hippocampus minor is no longer looked upon as the distinguishing peculiarity of the human brain, and it is not associated with language in any theory known to me. Whatever effects the destruction of this part in the left posterior cornu may have, it is not probable that it had any share in the affection of speech in the case under discussion. Nor can the unimportant loss of substance noticed in the thalamus and intraventricular corpus striatum have had any such effects. Clearly the important lesion was the extensive area of degeneration situate in the posterior part of the Sylvian fissure. The structures destroyed would be as follows :

a. The two posterior convolutions and part of the posterior external convolution of the insula with the white fibres which arise in the grey cortex of these convolutions, and pass almost entirely to the adjacent convolutions of

the parietal lobe overhanging the fissure, the supra-marginal lobule and part of the angular gyrus.

b. The grey matter and subjacent white fibres of the convolutions forming the upper wall of the Sylvian fissure behind the posterior ascending convolution of Rolando, viz. of the supra-marginal and angular gyri just mentioned. The degeneration involved the white substance to a considerable depth, undermining the convolutions, but not implicating their entire thickness, and it did not reach anywhere the summit of the gyri seen on the convexity of the hemisphere.

c. The posterior part of the claustrum, together with a mass of fibres underlying the posterior convolutions of the island, and running from behind forwards in the deep angle of the fissure. These fibres converging from various sources round the posterior end of the fissure, the angular, supra- and infra-marginal, parallel, and other gyri, form a large bundle or plane of fibres, which have a longitudinal course along the deep angle of the fissure, and pass to the foot of the two ascending parietal convolutions and to the posterior part of the third frontal. They constitute a kind of longitudinal commissure.

d. The posterior part of the external capsule, which is composed of fibres arising in the grey matter of the extra-ventricular corpus striatum and radiating to the fronto-parietal part of the hemisphere, after many of them have decussated with the fibres of the internal capsule.

The infra-marginal or first temporo-sphenoidal convolution, the seat of the auditory perceptive centre, had escaped damage in a remarkable way, and, on section, the grey matter of the extra-ventricular corpus striatum was seen not to have been reached.

It is to lesion of the longitudinal commissural fibres that I attribute the loss of nouns, as cutting off the naming centre from the motor speech apparatus. Those who have looked upon the island of Reil as the seat of the cell and fibre mechanism of speech may of course claim the case as supporting their view.

There are other remarkable facts observed in connection with loss of speech the significance of which has not yet been fathomed, which I therefore venture to mention briefly. One of these is the retention of the power of saying numbers when no other word can be said except "yes" and "no," and perhaps an interjectional exclamation. A patient, admitted into St. Mary's Hospital for right hemiplegia and loss of speech, diagnosed as due to hæmorrhage, while unable to say anything but "yes" and "no" could count up to twenty, could say at once how many pence there were in a shilling and how many shillings in a pound, and named without hesitation the number of coins shown to him; now and then he would say not only "two" or "five," but "two shillings" or "five shillings," being utterly unable to say "shillings" when told to repeat the word; the numeral dragged with it the noun. He would say "two and six" when shown this amount, but never could be got to say "half a crown."

A man now attending from time to time and who has been under observation for five or six years, can say only "yes" and "no" or sometimes indistinctly what is evidently "No, I can't." He cannot even repeat "no" when told to do so after he has just given that answer, the word being said over and over again for him to imitate. Once or twice after prolonged effort he has given it up in despair with a negative shake of the head and saying "No, I can't." This patient till quite recently could count up to twenty but never beyond, and he sometimes got confused at twelve and thirteen. He has always been able to tell us the number of spokes in a wheel (he is a wheelwright), twelve or fourteen, by counting up to the number and then stopping. He will give the number of coins shown to him, counting inaudibly but visibly. He writes numbers in figures much more promptly than he says them and without preliminary counting, as, for example, the number of fits he has had, the number of weeks since he came to the hospital, the amount of his earnings, &c. He usually gives these answers by

writing the figures on the palm of his hand, and he can count in writing up to thirty, forty, &c. He cannot write "yes" or "no," but he has been taught to write something like "Tring," to which place he has recently removed from town. He can show numbers up to ten on his fingers. Except numbers and the two or three other words mentioned, he cannot say a single word, and if told to repeat the alphabet makes futile attempts and often begins to count.

Such cases as these are not mere curiosities nor are they very great rarities. Other illustrations have come under my observation, and during a visit to St. Mary's Hospital Professor Gairdner described a case corresponding so exactly with the second of those just given that, the patient entering the ward at the time, I was able to say, "Why, here is your patient."

Provision will have to be made for them in any complete scheme of the mechanism of speech and thought. The explanation cannot lie in any distinction between emotional and intellectual expression such as is supposed to account for the utterance of oaths and interjections, and the retention of yes and no when no other words can be spoken. Number is an elementary abstract conception, and the idea of number is arrived at by a different process from that by which the formation of ideas of concrete objects is accomplished. In numerical computations our thoughts are turned inwards, so to speak, while in matters of form, &c., they are projected outwards. It is probably in relation with this difference that numbers can be spoken and written when no other words can. There is every reason to believe that in the cases cited the third left frontal gyrus is destroyed, and it is inconceivable that a small portion, concerned only with figures, should be spared.

As has been stated in previous communications, the writer is of opinion that the corpus striatum intervenes between the hemisphere and the nerve nuclei in the medulla and cord in language as in the movements of the

limbs, and that groups of cells, representing words as mere motor processes, are formed or arranged in this ganglion, which are employed in the utterance of speech by higher centres in the cortex—by the third left frontal for ordinary intellectual expression—while they are evidently reached from some other centres and set in action as emotional manifestations, and possibly in yet another way when numbers are concerned.

Singular complications again sometimes arise when reading and writing are included in the consideration of affections of speech.

In a case which was made the subject of a communication to 'Brain,' the patient perused his newspaper regularly and with all the marks of intelligent interest. He understood it also, for he went to the sister in a state of great excitement to tell her of the failure of a firm with which he had business relations, carrying the paper in his hand and pointing out the announcement; and he could always find a given paragraph when asked to do so as a test. When, however, he was asked to read aloud the result was gibberish. The following passage was selected:—"You may receive a report from other sources of a supposed attack on a British Consul-General. The affair, however, is utterly unworthy of consideration. No outrage was even intended, and the report is due to misrepresentation of the facts. The Odessa line is again working properly." It was read slowly and in a jerky manner, as nearly as it could be taken down thus:—"So sur wisjee coz wenement ap ripsy fro fruz fenement wiz a secona coz foz no sophias a thu freehled pothy conollied. This affaise eh oh cout oh curly of consequences. Uce sudos val oh esses entain ah thee enepol a oh dee ah messequence oh coz foz. The assoil lens a puff pifl miss corres porety."

It was evidently an effort to read aloud, requiring close attention, and he read seriously and steadily, apparently unconscious of the absurdity of his utterances (probably because he was too intent on his task), till he was inter-

rupted by laughter which it was impossible to restrain, in which he usually joined.

When asked to copy a sentence he wrote the short words quickly and in a good hand, but a long word he took down slowly, letter by letter, in large schoolboy characters, usually accurately, but as he wrote each letter he named it aloud and always wrongly ; he always, however, gave it the name of some letter or other, and not a name of his own invention.

In another case of a woman, the following verses taken from a book which the patient had been reading were taken down as read aloud :

First reading.

In litis deep its steepest tree
Under a spreading chestnut tree
 In villi small and sound ;
The village smithy stands ;
 The simist and the smallest man in this is he,
The smith a mighty man is he,
 He that that sinneth abands,
With large and sinewy hands,
 And the music of this biggy hands
And the muscles of his brawny arms
 { Those are this who are and is is abr.
 Are strong as iron bands.
 { Are those who is imin abanded.

Second reading.

Then is speedily and cheery tree
 The villi small and stern ;
 The smallest and the mightiest man is he
 There is large and singing hands,
 This is the smallest voice
 Are arm of those who is the ini hands.

Another interesting case may be added where writing alone was affected. The patient, the editor of a paper, was seen with Mr. Archer, of Avenue Road, in January,

1881. A week or ten days before, during convalescence from bronchitis, he had found, while trying to make up some accounts, that he could not write what he wanted, and this continued. In all other respects his intellectual powers were unaffected. He was tested in this way. First he was asked to copy a few lines from a book, which he did rather badly, putting in two "that's." He was then requested to dictate a note to Mr. Archer begging him to make an appointment with me. This he did promptly and fluently as follows :—" My dear Sir, I shall feel much obliged if you will have the goodness to make an early appointment with Mr. Broadbent." Finally, he was asked to write a note to the same effect. He took a considerable time over it, with the following result :—" Thursday, 27th January. My dear Mr. Archbent, I dear Sir, I am thirty feel myself I think myself better though to some respects that I have respect in some respects someferred from those fured, &c. Yours very truly." He asked anxiously if it was right and if there was any mistake in it.

It is not proposed to discuss these affections of the faculty of reading and writing. They are briefly placed on record, together with the case which forms the principal subject of this paper, partly on account of their intrinsic interest, and partly as showing that the relation of cerebral lesions to affections of speech is a subject by no means exhausted, and as furnishing material which may contribute to the elucidation of the problem. It might, however, be shown how they fall into their places in the hypothetical scheme to which reference has been made.