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APHASIA*

BY

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It seems nowadays to be the fashion in discussing aphasia to begin with the consideration of speech as a psychological function and to proceed to the analysis and classification of the dysphasias in terms of disordered thinking, with little concern for the problems of anatomy and physiology that must be involved when a disorder of speech results from local disease of the brain. This represents a swing of the pendulum away from the method of the older writers on this subject, who sought on the basis of clinical and pathological observation to classify the dysphasias in terms of the situation of the lesion and its interference with hypothetical centres and pathways serving the different functions involved. In those days the observation of a new type of dysphasia required some rearrangement of the plan of centres and pathways, which became more and more complicated and less and less satisfactory. Henry Head (1920), impatient of the diagram makers, swept their work aside and attempted a new classification of the dysphasias in psychological terms. In so doing he asserted that there was no such thing as an isolated affection of one part of the speech function. This struck at the foundations of all previous theory for which the occurrence of " pure " aphasias—word blindness, word deafness, pure motor aphasia, and agraphia—was essential. Head stated that in particular cases certain aspects of speech function might be disturbed more than others, but the function of speech was always disturbed as a whole. In one sense he was right, for the function of a whole must always depend to some extent upon that of its parts, but in another sense I believe he was wrong. His intentness on his own theories led him to ignore certain facts of clinical observation.

It is true that the disorders of speech function can be described only in psychological terms, but if we repeatedly observe in disease a specific disorder of speech function the occurrence entitles us to conclude that there are separate anatomical arrangements, or one might equally well call them neurophysiological dispositions, subserving the psychological function affected. This, I think, was what the more thoughtful of the earlier writers on aphasia meant when they used the word " centre ", though this term later became debased and has gone out of fashion. Jackson usually spoke of anatomical substrata. Neurophysiological disposition is perhaps better now that we think more in terms of circuits than areas.

If we examine the clinical facts impartially we shall find, I submit, abundant evidence of the localization of function in this sense. It is important, however, to begin with a clear idea of what we mean by the function of speech. As I understand it, this includes all psychological processes involving the use of language, including the understanding of speech both spoken and written, the expression of speech in both forms, and the use of words in thinking. The understanding and expressive use of figures and musical notes are so closely allied to the function of speech that they should also be considered in any discussion of aphasia. I have said that for the conclusion that there is localization of function in the sense used there must be repeated observation of particular disorder. We should not expect these specific disorders of function to be at all common, for cerebral disease is rarely so circumscribed or selective as to be capable of producing such effects.

There are, however, to be found numerous examples of speech disorder so distinct from one another that they must depend upon the loss by disease of separate anatomical arrangements. Of these the best known is the condition first described by Déjerine (1892) as pure word blindness. Many instances have since been recorded and the subject has recently been reviewed by Holmes (1950), with the addition of an excellent case. The essential features are, as the name implies, inability to read, with preservation of understanding of the spoken word, and the ability to name objects, speak, and

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write. I have myself seen several such cases, and it is indeed remarkable to meet a person whose intelligence is unimpaired, whose powers of conversation are entirely normal, who is able to write letters or essays without the least difficulty, but is unable to read a word of what he has written. These cases, however, differ in small respects from one another. In most of the recorded cases the ability to read music has been lost when it was previously possessed, but Hinshelwood (1900) and others since have reported examples in which this ability was preserved, although words could not be read. In nearly all cases the ability to read numerals is preserved, together with the power of calculation. In such cases, as I have myself observed, Roman numerals have no meaning for the patient. He reads them, if at all, as letters.

Even within the clinical syndrome of pure word blindness, therefore, there are to be found refinements of symptomatology which must surely depend upon equivalent refinements of structural organization. To support this conclusion there are cases in which the patient can read words, but not figures, and there is a case recorded by Proust (1872) of a patient, previously an accomplished musician, who without any reading disability in the ordinary sense, after what was presumably a vascular lesion, could still compose and write musical notes, though he was quite unable to read them—the musical counterpart of pure word blindness.

These observations indicate the existence of separate neurophysiological dispositions or anatomical arrangements for the functions concerned, without so far pointing to any well defined situation of the lesion, and precise definition has so far proved impossible. Nevertheless there are clues which have important localizing value. In nearly all the recorded cases of pure word blindness there has been right homonymous hemianopia : in none has there been any sensory impairment or spatial disorientation. There is abundant evidence from cases of gunshot wounds of the occipital cortex to show that a patient with hemianopia from a lesion in this situation does not have word blindness. The lesion responsible for pure word blindness, therefore, presumably involves the optic radiation before it reaches the striate cortex and after it has left the parietal lobe. It has been argued by Déjerine (1892), Bastian (1898), and others that afferent pathways from the right occipital lobe crossing in the corpus callosum must be involved to account for word blindness in the whole of both visual fields, and this seems a reasonable assumption.

The patient with word blindness of the type we have been discussing can neither read to himself nor aloud. There is, however, a much rarer form of word blindness in which reading aloud is possible but there is no comprehension of what is read. Wilson (1926) remarks of such a case :

> " The patient can read aloud in a mechanical way and be at the same time ignorant or oblivious of the meaning of what he reads—exactly as a person of sufficient education can pronounce and read a foreign language from the text while every particle of meaning is hid from him."

Such a patient, as Wilson says, is suffering from word-meaning-blindness, not from word-sight-blindness. This state of affairs, however, can surely only exist when there is also word deafness, or the patient reading aloud would hear and understand the words as he said them. I suppose this to be so and have only met with word-meaning blindness in association with word deafness. In one such case, to which I shall refer later, the power of reading figures was unimpaired, the patient was able to calculate with ease and kept his own accounts. But he could not appreciate the significance of Roman numerals. Given XVII he read out " Ex-vee-one-one " though 17 was read aloud accurately and understood. Nor could he interpret the signs for multiplication, subtraction and so on, but if the figures were arranged for him in such a way that he could understand what was required of him without the conventional signs his calculations were prompt and accurate.

Pure word deafness is much rarer than pure word blindness, probably because the anatomical arrangements concerned are packed into a region which has many other functions. There are nevertheless many well authenticated examples. One of the most recent is that reported by Hemphill and Stengel (1940), a traumatic case in a labourer aged 34. The head injury was due to a fall, and there was a fissured fracture of the left squamous temporal bone with a post-traumatic amnesia of three or four days. When recovered from the traumatic confusion the patient was thought to be deaf, but this was disproved by audiometry and clinical observation. The main facts about this patient are as follows. He talked fluently without paraphasia or grammatical error, and the same was true of his writing. He could read correctly and understand what he read. His intellectual functions were normal for his educational background and social status. He was, however, almost totally unable to comprehend the spoken word. The case report is of particular value in that it includes the patient's running commentary upon his own disability. For example, asked, " What is your name ?", his response was, " Voice comes but no words. I can

hear, sound comes but words don't separate." Asked again, " How are you ?" " That is letters what you are saying." Told, " Show your tongue ". Response, " I can't get it. I can hear your voice coming, but it does not finish. Your voice is dead plain." Summarizing his own experience, he said, " I can hear you dead plain, but I cannot get what you say. The noises are not quite natural. I hear your voice, but not the words. I can hear but not understand. It does not pronounce itself." This is as good an example as any in the literature of word-sound-deafness in a pure form, comparable in almost every respect with pure word blindness. Here we have again a defect of function so circumscribed that it must have localizing value. What anatomical evidence exists in such cases points to the middle part of the left superior temporal gyrus, adjacent to the auditory cortex, as the site of the lesion.

Of even rarer occurrence than word-sound-deafness is word-meaning-deafness. Here the patient can repeat the words he hears without understanding their meaning. This I have not observed except in association with some other disturbance of speech function, nor can I find any clear account in the literature of pure word-meaning-deafness, though Wilson seems to imply that he has seen it. It has usually been observed after partial recovery from a more general kind of dysphasia as in Byrom Bramwell's case (1897) of a young woman who had a sudden cerebral attack after a confinement, resulting in a gross disorder of speech function both on the expressive and the receptive sides, but more severe on the latter. She made a rapid recovery in other respects but was left with a severe impairment of understanding the spoken word. Her condition is thus summarized by Byrom Bramwell. The patient could repeat correctly words and sentences which she could not understand when spoken, and could write from dictation long sentences which she was quite unable to understand by the ear, though she was able to read and understand what she had written. At this time there appears to have been no impairment of speech function on the outgoing side, nor any difficulty in reading, but there was some difficulty in naming objects.

This last defect, that of naming objects, appears to have been present in all the cases of word-meaning-deafness so far recorded, as it was in the only case I have had the opportunity of studying in detail. This was of exceptional interest in that the patient suffered from both word-meaning-deafness and word-meaning-blindness, and apart from these defects and the inability to name objects showed little other disturbance of speech function. The patient was a man aged 50 on his first admission to hospital, previously of good intelligence and Deputy Clerk of Works at the Bank of England, who had for two years shown symptoms of an insidiously progressive dementia, probably due to Pick's disease, though he is still living and the diagnosis has therefore not been established. He had been at his work until the date of his admission, evidence that at that time the dementia was not far advanced. His chief disability at that time was difficulty in understanding what was said to him. To this later was added an equal difficulty in understanding what he read and a particular difficulty in naming objects.

I have records of many conversations with this patient, conducted, of course, with great difficulty and with the aid of pantomime, and shall try to convey to you by means of an extract the nature of his speech disorder. In spontaneous speech he was quite eloquent within the limitations of his confined interests and imperfect memory. He would talk at length about his past experiences and especially of his work at the Bank. He was equally fluent in writing of these experiences. He could also, when he understood what was required of him, give an accurate account either in speech or writing of a day in the ward. In conversation and writing as a rule he formed his words and sentences correctly, and pronunciation and intonation were normal. Only very occasionally did he use wrong or mutilated words. He was able to repeat words and sentences correctly, wrote correctly to dictation, copied letters and words in capitals or script and transcribed from script to capitals or vice versa quickly and accurately, and could read aloud without difficulty, though with occasional mispronunciation. But he could understand little of what he heard or read.

Here is a record of part of one of our interviews. His pronunciation was correct unless otherwise indicated. My questions were verbal except those in italics which were written.

Question. What are your initials ?	Response. What's initials ? (correctly pronounced).
Q. *Initials.*	R. In - it - eye - als. What's that ?
Q. *Initials.*	R. In - it - eye - als. Don't know what that is though.
Q. *Your initials are C. L.*	R. Your in - it - eye - als are C. L. C. L. that's me. Charles Leale.
Q. Your initials are C. L.	R. I don't know that.
Q. What is your Christian name ?	R. I don't know what Christian is.

Q. Your surname is Leale?	R. Yes, L - E - A - L - E.
Q. What is your surname?	R. My surname—Charles Frederick Leale—is that what you mean?
Q. Your Christian name is what?	R. What's Christian mean? I don't know that word.
Q. Your surname is what?	R. What is the word surname? My name?
Q. What is your name?	R. My name! Charles Frederick Leale.
Q. What is your Christian name?	R. My name? Leale do you mean?
Q. *Surname is Leale.*	R. (Read aloud correctly). Adds, Is that my time you've got at the top, 50? I'm not 50. I'm 53. (This reference was to his age written on the sheet of paper I was using. It was stated as 50, his age when first admitted three years previously.)
Q. *Christian names are Charles Frederick.*	R. (Read aloud correctly).
Q. What are your Christian names?	R. What is Christian name? Christianity comes throughout the world.
Q. What is your surname?	R. Don't know that, surname, what's surname?
Q. *What is your surname?*	R. (Read aloud correctly).
Q. Yes?	R. (Re-reads correctly). Is that my name?
Q. What *is* your surname?	R. What is surname?
Q. *Your surname is Leale.*	R. (Read aloud correctly).
Q. What is your surname?	R. What is surname?
Q. What is your name?	R. My name is Leale (promptly and in a tone which implies of course).
Q. What are your other names?	R. My wife's name? My boy is married.
Q. What are your names besides Leale?	R. What's names? What?
Q. What are your names besides Leale?	R. What's "sides"? My boy's and girl's names?
Q. Are you Harry Leale?	R. What's Harry?
Q. Are you George?	R. What's George?
Q. *Are you George Leale?*	R. (Read aloud correctly).
Q. Are you Charles Frederick Leale?	R. I'm Charles Frederick Leale—Yes (again tone implies of course).
Q. Who am I?	R. What? What's your name? You are Sir Charles aren't you? I forget.

That his difficulty was essentially that of understanding speech could be shown in a variety of ways. For example, he had no difficulty in understanding and reading figures and was able to do quite complicated sums. He showed, however, the inability to appreciate Roman numerals which is characteristic of word blindness. When a collection of coins and notes was placed before him he had no difficulty in identifying them to request, provided that the wording was numerical. If the significance of the request depended upon words it was usually missed. Asked to show a two and sixpence, he did so promptly: asked to show a half-crown, he simply said, "What's half-crown—I don't know". Asked to show a pound, he would look puzzled, and would sometimes, but not always, succeed. Asked to show the quid, he said, "Eh? What's a quid?" His response to written instruction was similar. When I wrote "Show me the 10s." he read it aloud and at once did so. When I next wrote "Show me the ten bob" he read it aloud correctly and then said "Show me the ten bob—what's bob?"

One of the most interesting features of his condition was his ability to use in expressing his own thoughts words which had no meaning for him when I said or wrote them. For example, I got him after some difficulty with repetition, gesture, and pantomime to answer the question, "What was your work?" and he replied, "I was an expert in the building trade." I then said, "What is trade?", and his response was, "Trade? What's trade? What is that word? I don't know." He could do no better when I wrote the question. In this respect his behaviour was so odd that anyone examining him for the first time might have thought he was play-acting, but throughout many interviews the disorder of speech remained quite consistent. It was evident that he was indeed suffering from word-meaning-deafness and word-meaning-blindness with relatively little impairment of the ability to express his own thoughts in speech or writing. The disorder was almost wholly on the receptive side, though he had, as I have already said, the inability to name objects whose use he could readily demonstrate.

I do not suppose it to be possible to define the situation of the lesion responsible for this man's symptoms in anatomical terms or to interpret the disorder of function in terms of physiology. The disorder is psychological, but its occurrence as a well defined symptom complex from organic disease implies disorganization of specific anatomical arrangements.

So far I have dealt with the receptive aspects of

speech function. I agree with Wilson (1926) that this is a better term than sensory, which has a physiological meaning and is inappropriate for the description of psychological disorder. On the expressive side there is also evidence of localization of function. There is no doubt of the occasional occurrence, from vascular lesion or localized injury, of dumbness or mutism without impairment of comprehension of the spoken or written word, and without any defect of writing. This was the clinical picture first described by Broca in association with a lesion at the posterior end of the inferior frontal gyrus, and this localization has been proved true in other cases. For some years I had a woman under my care at this hospital who awoke one morning bereft of speech, but at no time had any difficulty in expressing herself in writing. This method, however, she found too cumbersome for conversation, and she therefore trained her sister to act as interpreter. She would trace with her forefinger letters on the back of her sister's hand, and the latter would speak for her. Quick to understand what she heard and read and eager to express herself to me, this alert old lady has left a lasting impression on my mind. She never spoke again, died later as far as I recollect from a lesion in the other hemisphere, and proved to have a small area of softening in the appropriate situation on the left.

Most of these patients show some degree of recovery, and it is then possible, as Bastian (1898) first observed, to distinguish between two kinds of expressive disorder. In one a few words first return, " Yes ", " No ", or expletives, or a phrase or two, and are correctly pronounced, but often inappropriately used. In response to stimulation the patient's lips either form these words or are motionless. In the other variety recovery begins with attempts at articulation, which as soon as they begin to be audible can be recognized as appropriate and grammatical expressions of thought. This condition Bastian called " aphemia," and it is unfortunate that the name has not been kept for it. I have seen several examples, and in each instance there has been so complete a paralysis of the face on the opposite side to the cerebral lesion as to suggest a lower neuron affection. This may be limited to voluntary movement, as in the case of a woman I saw who showed no movement either of the upper or lower half of the right face on request, though the left half moved normally. When, however, she wept facial movement was symmetrical. She had been found in the early morning mute and in a state of extreme agitation, and was thought to be suffering from a state of agitated depression. The dissociated facial weakness was interpreted as hysterical. When I gave her pencil and paper the expression of relief in her eyes and the eagerness and fluency with which she wrote an account of her disability were dramatic. Bastian proposed an anatomico-physiological distinction between what he called " motor aphasia " and aphemia as follows. In motor aphasia he thought the area for kinaesthetic images of words was destroyed, in aphemia the descending fibres from this area going with the pyramidal fibres to the lower motor neurons for the muscles of articulation. Hence, he argued, the complete escape in aphemia, even in the stage of mutism, of intellectual function. In motor aphasia, on the other hand, the loss of kinaesthetic images might, and, he supposed, did, interfere with thought, which may be formulated to some extent by the revival of kinaesthetic images—silent speech. It is true, so far as my own observations go, that the patient with motor aphasia does in the early stages show confusion, while the aphemic does not.

I have recently had a patient with aphemia under my care, whom I persuaded, after he had been mute for several days, first to intone the vowels, and then to sing with me the first words of " Three blind mice ". He thereupon wrote, " The secret of this is that in singing preoccupation with the melody seems to remove some kind of inhibition. It reminds me of Dr. Johnson's remark that things too silly to be said may yet be sung ". He clearly had no disorder of thought or its expression in words.

Pure agraphia I have never seen, nor read a satisfactory account of a case, though there are several on record in which writing has been much more severely affected than speech. If there are separate anatomical arrangements for writing, as there well may be, they are probably so closely intertwined with those for the more general use of the hand that paralysis hides the agraphia.

The examples I have taken to illustrate the localization of speech function have been of the simplest kind. The disorders of speech usually encountered are complex and involve both reception and expression, though the one may be much more severely involved than the other. These more complex speech disorders can and should be studied with the object of analysis and classification, and it is in this field that Head in particular advanced so far, though his classifications have never been widely accepted and have contributed little of practical value for the clinician. But unless classifications are established the opportunities occasionally offered by disease for the localization of function will be missed, and, as I have already stated, if a special type of speech disorder can be

isolated by clinical observation and subsequently recognized, this affords proof that there are special parts of the brain concerned with this function even though we do not know at present exactly where they are. The simplest or " pure " types of aphasia provide the best starting point for the advance of knowledge, which has been hindered by the extreme rarity of such cases.

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