PSYCHOLOGY AND APHASIA.

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Theories of aphasia are psychological in that they concern disturbances of speech, which are primarily psychical phenomena; they are neurological in so far as the explanation of these disturbances is neurological. They must, therefore, inevitably reflect their authors' knowledge of the psychology and neurology of their patients: generally they reflect also the knowledge and methodology of the period in which they are propounded.

It is one of the merits and misfortunes of Hughlings Jackson's work that it was in advance of his time: he saw clearly that aphasia was primarily a psychological phenomenon, that the speech and behaviour of the patient had to be studied and accurately recorded before any attempt was made to correlate it with anatomical changes, that it was advisable to consider what psychologists and philologists knew regarding thought and speech, and that speech, being only one form of mental activity, should be studied in relationship to other forms. In his insistence on the need for making a careful and full record of the behaviour of his patients he pointed the way to modern psychological practice. Not very long ago philosophers used to write psychological treatises based solely on what they learned by casual observation of their own experiences and the behaviour of others: these treatises were a curious mixture of crude introspection and hazy and often dogmatic speculation. The introduction of scientific method and especially of the experimental method has shown the value of careful, systematic study under conditions which have been arranged beforehand.

While he appreciated the psychological problems of aphasia, Hughlings Jackson was also aware of the danger of taking over the concepts of popular psychology, and he was acutely conscious of the treachery of words. "We must," he said, "bear in mind that 'will,' 'memory,' and 'emotion' are only the names men have invented for different aspects of the ever present and yet always changing latest and highest mental states, which in their totality constitute what we call consciousness, consciousness being really a name for a series of varying and different consciousnesses." "Taking 'will,' 'memory,' and 'emotion' to be real independent entities or faculties reminds one of the old woman's remark, 'How lucky it was that Adam called all the animals by their right names.'"⁽¹⁾

This caution is especially necessary in the study of aphasia, where a disturbance of language and thought is caused by some cerebral lesion about which exact information is often unobtainable. Experimental lesions are impracticable except on the lower animals, and *their* behaviour is so different from ours that inferences from such experiments have to be made with extreme caution; as far as humans are concerned, we have to be content with accidental lesions. The neurological examination is difficult enough. Often an autopsy is impossible, and, when it is not, it may follow the initial injury after a long period during which progressive changes either of destruction or of repair may have occurred; the effects of the lesions may be diffusely localised; and the histological structure of the brain is so complex and its physiology so obscure that the examination is

perforce a rough and ready affair, macroscopic rather than microscopic: it is as if one tried to find the cause of a disorganisation of the trade and industry of a country by examining its geographical contours from a height at which it was impossible to distinguish much more than the difference between land and water.

If this be accompanied by a crude psychological examination, then the situation is hopeless, and much of the psychology on which theories of cerebral localization have been based is crude in the extreme; it is hardly above the level of that of the man in the street. The traditional theories of aphasia reflect the psychology which was popular at the time of their formation, that of association, in its crudest form. Stated briefly, the theory is that sensory experiences, sounds, tastes, colours, etc., which occur together, either simultaneously or in immediate succession, leave behind them some kind of after-effect in virtue of which when one recurs the others recur in the original spatial or temporal order. All recollection, knowing and thinking are, according to this theory, ultimately reducible to such associations.

The old associationists were cautious in their terminology; they used the ambiguous and indefinite word "idea;" one idea, they said, suggested another. Medical psychologists have been less wary, but more precise, most of them speak of mental images rather than of ideas. Each sensory experience, it is said, is accompanied by (or determined by) some neurological process which leaves behind in the nervous system some kind of after-effect such that when the seat of the after-effect is subsequently re-excited, there is a ghostly revival of the original experience, a visual image, an auditory image, or an image of some other kind. It is further assumed that when any part of the original series recurs, there is a tendency for the nervous excitation to spread in such a way as to revive the original experience in all its complexity, but in images.

"If I step aside on seeing a rattlesnake, from considering how dangerous an animal he is, the mental materials which constitute my prudential reflection are images more or less vivid of the movement of his head, of a sudden pain in my leg, of a state of terror, a swelling of the limb, a chill, delirium, unconsciousness, etc., etc., and the ruin of my hopes. But all these images are constructed out of my past experiences. They are reproductions of what I have felt or witnessed."⁽²⁾

It is also assumed that in some marvellous way these mental images are sorted out and pigeon-holed in the brain, so that auditory images of words are stored in one part of it, auditory images of melodies in another, and, if you speak two languages, the auditory images of the two languages are put into different pigeon-holes; similarly there is a centre for written language, another for spoken language, another for heard language, and so on, where words and phrases are neatly and tidily sorted out and docketed.

Now, apart altogether from the difficulty of conceiving any kind of anatomical mechanism with these properties that agrees with what is known of the histology and physiology of the brain, the psychological basis of the theory is by no means secure. It is true that we do sometimes have mental images of former perceptual experiences; it is true that memories often follow one another in the order of their original occurrence; it is true that one may be able to

understand or to speak a language without being able to write it, and that one may forget one language without forgetting another: but these are not all the facts with which we have to reckon in trying to understand aphasia and the other problems of memory.

Comparative studies of mental imagery have shown that most people have images of one kind or another, and that these images often appear when an effort is made to recall some past event; but they have also shown that there are amazing individual differences in the nature, clearness, frequency, and stability of these images and in the part they appear to play in thought and recollection. Some people have images so hazy that they are not sure of their existence; others seem to have none at all; others have images that are hallucinatory in their clearness and stability: often the images that do appear are irrelevant, but their irrelevance does not appear to affect recollection; indeed, there is good ground for thinking that the formation of a mental image is usually secondary to the recollection, for it very often follows the recollection. The following observation may make this clear.

A group of artists claimed that they could and usually did paint from their visual images; so they were asked to picture in imagination and then to draw a spade, a fox terrier, and a human head or figure. They knew each of these objects and, though they had previously drawn only the last, they said that they could visualize all of them. They made excellent drawings of the head or figure, their spades were quite good, but their fox terriers were unrecognizable; they were little better than a child might draw. Now, there could be no doubt regarding their ability to draw what they could see; hence it seems legitimate to infer that they drew from their knowledge of things and that their mental images were just concrete expressions of this knowledge: they had the artist's knowledge of the human figure but not of the form of the terrier. Inability to form an image seems to have little or no effect on one's ability to recognize, to recall or to think about things: one may be unable to form a single smell image and yet experience no difficulty in thinking about and describing smells, so that others get no indication of the existence of the defect.

It is difficult for those who have abundant and vivid imagery to believe that this is possible: what, they ask, is there to recall if there are no mental images? Now, it is clearly illogical to infer that a thing cannot be, because you cannot explain it; and it is equally unreasonable to claim that the only modes of thinking are your own and that a man is mistaken because his experiences seem to be different from yours. One of the most astounding results of psychological research has been its revelation of the differences between people in the ways in which they think and feel about the same things. Let half a dozen men read the same story or witness the same event and then describe their impressions of it, and you get such amazing differences that you may wonder whether they are describing the same thing. It is a common, indeed quite natural, but serious error to suppose that the same external conditions excite in others exactly the same experiences as they do in ourselves. The only way to combat this error is to have systematic observations made and described by different individuals under approximately similar conditions, in other words, to use the experimental method.

This method has been used in the study of perception, imagery, recollection, and the thought processes, and the fruits of this study have some bearing on the problems of aphasia.

Perhaps the most important part of this work in so far as it bears on aphasia concerns the nature of the thought processes, the possibility of imageless thought, the development of language and the function of imagery in thinking. According to the traditional associationist theory the past is revived and exercises its influence on the present by means of mental images; perceived objects are recognized through their attendant halo of images of their past associates; the meaning of a word is given by a similar halo; and thinking is nothing more than the connecting up of such halos.

Ribot⁽³⁾ was one of the first to try to find experimentally what there is in consciousness when a general term is used. He found that some of his observers were at times unable to discover anything but the word itself, and Ribot, thinking there must be something, suggested that it was an obscure, unconscious element, but he did not attempt to define it. This something else came out very clearly in the subsequent work of Marbe, Binet, Watt, Bühler and Moore. Marbe,⁽⁴⁾ in his study of judgment, discovered attitudes of consciousness (*Bewusstseinlagen*) which were different from either sensations or images. Binet⁽⁵⁾ confirmed this finding. Watt⁽⁶⁾ in his association experiments found that these attitudes were determined by the task which was put to his subjects. Messer⁽⁷⁾ in his experiments found no case in which the understanding of a word was dependent on an image, and that, when an image did appear, the meaning often came first. Bühler⁽⁸⁾ after his exhaustive work on the thought processes came to the conclusion that there was a clear distinction between thought and imagery, that the ultimate elements of the thought-processes were thoughts, not images. Moore⁽⁹⁾ in his work on abstraction found that mental images were not essential either in perception or for recognition, that the essential elements were not images.

This is not the place to attempt to discuss the development of the conceptual element in experience; it is, however, sufficiently clear that the simple psychological theory of the "diagram-makers," as Head calls them, will not explain the facts of aphasia, for if it does not represent accurately the facts of normal experience, it cannot account for disturbances of thought and language. The outcome of this work on the thought-processes suggests that inaccurate and inadequate clinical examination of the behaviour and experience of the patients may account for the tiresome literature and bitter controversies that have grown up round this subject of aphasia, which seems to have an irritating effect on the feelings of those who study it and write about it, perhaps because each of the disputants gets only a little bit of the truth and succeeds in distorting it. The facts of aphasia are not so simple as they have seemed.

It is difficult to decide whether a patient has mental images at all, for he is the only person who can have direct cognizance of them: we have to rely on his own account, checking his statements by features of his behaviour which are known to be the usual accompaniments of imaging, such as the tendency of the visualizer to confuse in recollection things that look alike. Head says that the

power of evoking visual images as such is not affected by the disorders of speech which he discusses in his "*Aphasia and Kindred Disorders*": "Mental images remain, but the means of converting them into the materials for logical thought have been disturbed or grossly diminished. They cannot be employed in continued processes of symbolic formulation and expression or evoked in response to words or other symbols."

Perhaps more important than the work on imageless thought in its bearing on aphasia is the change in the outlook of psychologists regarding the nature of mind. Influenced by the thought and theories of chemists, who aimed at explaining all chemical phenomena by the interaction and union of a comparatively few elementary substances, the psychologists of the last century tended to think of mind as particulate, as a sort of mosaic consisting of elements stuck together with little or no relationship to one another beyond their spatial and temporal connections. This sensationalist view of mind succeeded in eliminating personality.

The tendency now is to drop this point of view and adopt one which is nearer to that of physiology. A similar change has come over the chemical and physical sciences where the dead-matter theories have given place to others which are essentially dynamic. This dynamic view appears in most modern psychological work and has been forcibly expressed by Wertheimer, Kohler, Koffka and others of the Gestalt School who never tire of insisting that the whole is not just the sum of its parts, and that in studying mental phenomena it is necessary to take them entire in their own setting.

In its bearing on aphasia this tendency has been most clearly expressed by Head who points out that mental activity is the culmination of a hierarchy of integrations effected by the central nervous system, and that the purposiveness and unitary character of mental activity appears at the lower levels of integration. "Every aspect of mental activity," he says, "is based on a multitude of conscious and unconscious processes, which, as a result of a series of integrations, culminate in a unitary response adapted to the total situation."⁽¹⁰⁾

The functioning of even the simplest of the nervous arcs must be considered in relationship to its place in the system to which it belongs and to the condition of that system, for its activities vary with the condition of the rest of the organism. Similarly, in the study of mental phenomena it is necessary to remember that sensation, perception, concept, and image are, as Hughlings Jackson pointed out, abstractions, the result of a process of analysis, and that they are to be understood only in relation to the rest of experience. "We do not either speak or think in words or signs only, but in words or signs referring to one another in a particular manner, any more than we move single muscles, or muscles co-ordinated to a particular end. Indeed, words in sentences lose their individual meaning—if single words can be strictly said to have any meaning—and the whole sentence becomes a unit, not a word-heap."⁽¹¹⁾

It is commonly supposed that language consists of words each with its own meaning, and that the learning of a language is just a matter of learning these

meanings and stringing them together. Actually the normal process of learning a language does not proceed in this way, except in the artificial atmosphere of the school-room. The whole of a sentence or phrase is heard as a sound pattern in a certain situation and is in thought connected with that situation: the repetition of the sound pattern excites an expectation to experience the same situation again; if the expectation is not completely realised, the significance of the sound is narrowed down. By hearing the same sound (word) in different sound-patterns and under different conditions, one gradually analyses language into words. There are many common phrases in which the significance of the individual words is not very obvious, a fact which appears most clearly in the writing of semi-literate people, who know the significance of phrases which they cannot analyse into words.

Whatever may be the nature of the physiological processes underlying these activities, they certainly are not of a kind which makes it possible to allocate to each word—seen, heard or spoken—its own lodging-place in the cerebral cortex. It is more probable that corresponding to sentences, phrases and words there are complex patterns of physiological processes, and that the analysis of sentences into words and the learning of a language depend on the canalisation of these physiological patterns.

Such a theory offers some possibility of bringing speech into relationship with other mental activities and of explaining the many facts to which Hughlings Jackson repeatedly called attention and which have so often been ignored, such as the variability in the nature of the speech disorders of the aphasic, his difficulty in "propositionizing," the fact that he is not altogether wordless, that the words and phrases he uses are those which he has used frequently and in association with emotional experiences, and the fact that he can often speak when he does not think about speaking and breaks down when he does think about it.

Apart from the contributions made by its new conceptions and the results of the comparative study of thought and language,* psychological science has elaborated methods which have already been applied with success in the study of aphasia. In investigating the different degrees of complexity of human thought and behaviour it has been found necessary to abandon casual observation and to plan and apply systematic sets of exercises, graded in difficulty, and to interpret the patient's responses with due regard to their psychological and statistical significance. What can be done by using a well-planned set of tests is well illustrated in the brilliant work of Sir Henry Head.

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*See the researches of Pick, Gelb and Goldstein, Head and Holmes.