

A case of dyslexia : a peculiar form of word-blindness / by James Hinshelwood.

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Publication/Creation

[London] : Printed at The Lancet office, 1896.

Persistent URL

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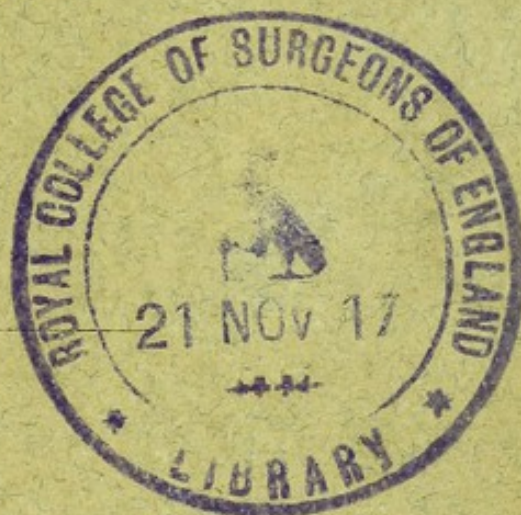
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DYSLEXIA: A PECULIAR FORM OF
WORD-BLINDNESS

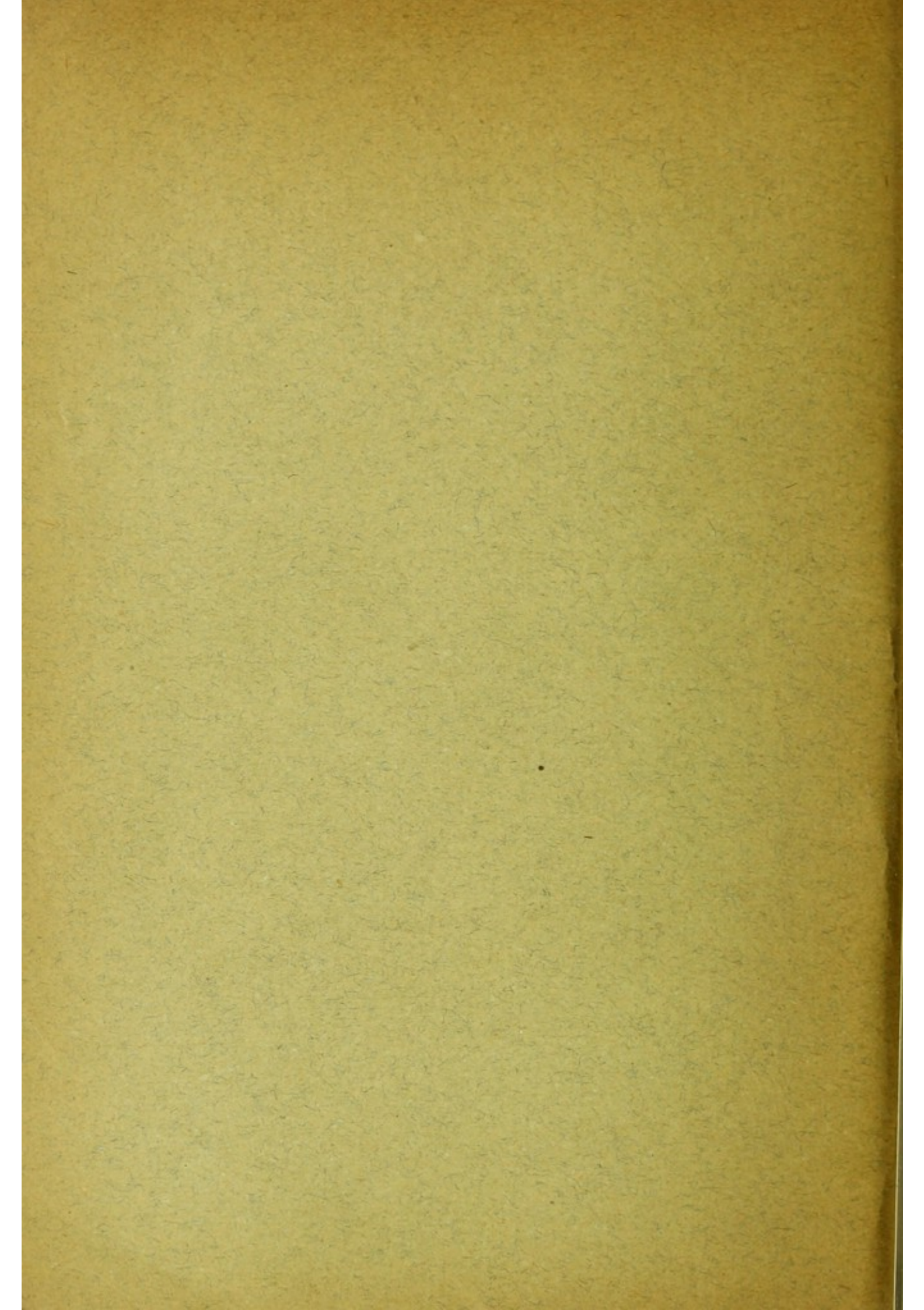
BY

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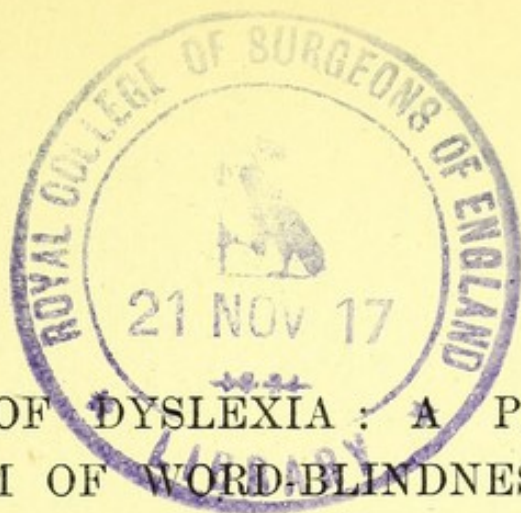
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A CASE OF DYSLEXIA : A PECULIAR FORM OF WORD-BLINDNESS.¹

LAST year I made a communication to the Glasgow Medico-Chirurgical Society on word-blindness and visual memory² based upon a remarkable case which had come under my observation. The following case, though different in many respects from that reported last year, yet belongs, in my opinion, to the same group. The patient was seen by me in Professor McCall Anderson's wards in the Western Infirmary, Glasgow, and with his kind permission I am enabled to report the case. Without further preface I will briefly narrate, and thereafter discuss, the salient features of it.

The patient, a tailor aged forty-five years, was admitted into the Western Infirmary on March 4th, 1896. He stated that he had always enjoyed good health and had recollection of only one illness in his lifetime—an attack of influenza some years ago. He had drank freely for many years, but during the last twelve months had been very temperate in the use of alcohol. On admission he complained that he had been unable to follow his employment during the last six months because he became stupid, as he expressed it, when he attempted to do anything. The patient not being a very intelligent man it was exceedingly difficult to elicit any precise description from him as to the nature of this mental confusion. He always described himself as getting stupid and his head giving way when he attempted to work. He complained, also, of not being able to read since his illness began, and it was a close analysis of this symptom which revealed the true character of the mental derangement from which he was suffering. On examination with the test-types it was evident that the visual disorder was a very peculiar one. On attempting to

¹ A paper read at a meeting of the Glasgow Medico-Chirurgical Society on Oct. 2nd, 1896.

² THE LANCET, Dec. 21st, 1895.

read he read the first few words quite correctly and then suddenly came to a stop, saying he could not go on. After reading a little he would begin again with precisely the same result, always coming to a stop after reading a few words. On asking him how it was that he could not continue to read he said that although he could see the letters quite distinctly he became stupid—they seemed to lose all meaning for him. He particularly said, in answer to further inquiry that there was no blurring of the letters and that they did not seem to run together. This difficulty had nothing to do with diminished visual acuity, as the result was precisely the same with the largest as with the smallest of the test-types. Further, on the application of other visual tests it was evident that the visual acuity was unimpaired. The attempt to read seemed to cost him great mental effort and he frequently put his hands to his head during the trials. He experienced no pain, but simply a sense of great mental fatigue. His difficulty was the same with printing and writing. In order to get more exact information as to the way in which he had recently done his work inquiries were made at his employer, who furnished us with the following information. The patient used to be a very good workman, but for some time before his dismissal his work had been done very badly. Latterly he seemed to forget after he started to work how to proceed with it. On making a garment every successive step had to be pointed out to him, just as to a man who had never done the work before. He often made the most absurd mistakes in sewing the wrong pieces of garments together, and did not seem to recognise the shapes and relative positions of different pieces that were to be sewed together. Even when he did sew the correct pieces together his sewing was frequently so bad, like that of the merest beginner, that it had often to be ripped up. Sometimes his work would be torn up three or four times in the making of a single garment. These defects became so bad that he was dismissed, as he had been for some time practically of no use in the workshop. His fellow-workmen also observed that he spent a large portion of his time in looking for things which he had put away. Half of his time was latterly spent in looking for his needle and thread, his thimble, his glasses, or the parts of the garment he was working at and which he had put aside for a little while. He could not recollect even a few minutes afterwards where he had placed anything. The patient also informed me that of late he had frequently lost his way in

parts of the city with which he was perfectly familiar, and only got home with great difficulty and by repeatedly asking information from passers-by. Two days before coming to the Infirmary he went into Glasgow Green for a walk. He was perfectly familiar for years with the Green, and though his house was close to it he completely lost his way. He found his way home with the greatest difficulty after several hours' wandering about and making numerous inquiries. At last a friend met him and led him home. This did not occur every day, but only occasionally, although of late more frequently. On asking him to explain this he said that he seemed suddenly to forget all about the directions of the different streets and that his whole surroundings seemed for the time quite new and strange. On examination of the patient no objective signs of disease could be discovered. A careful examination of the nervous system revealed no abnormality. His eyes were normal in every respect. There was a slight amount of presbyopia, for which he was wearing suitable glasses. The refraction, the visual acuity, the visual fields, and the fundus were all normal. The eye muscles, which were carefully examined, revealed no abnormality. There was no general deterioration of the mental powers. The patient's mind in other respects seemed clear and active. His memory for past events did not seem to be at all impaired. There were no disturbances of speech. He was put upon arsenic and strychnine and during his residence in hospital there was great improvement in his condition. He was advised to practise reading for a short time every day. There was steady and continuous improvement. The time during which he could continue to read gradually increased until before he left the Infirmary he could read for any length of time. He was dismissed on April 24th, after seven weeks' stay. His general condition was improved and he gained a stone in weight during his residence in hospital. He went to the Lanark home for a few weeks and after leaving there resumed his employment. I saw him last in the beginning of August, three months after his dismissal from hospital. He was continuing well. He could read fluently and without effort. He never lost his way in the town. He was engaged at his employment of tailoring, although he said that he could not do his work as well or as smartly as before his illness, but he never made the absurd mistakes which he used to do. The main factor in contributing to the rapid improvement of the patient was

in my opinion the complete withdrawal of the alcohol. Although for nearly a year preceding his admission into hospital the patient, becoming alarmed about his condition, had been very temperate, yet he was not a total abstainer, and indulged daily in alcohol, but with great moderation. But we know from experience that when a toxic condition has been established by excessive indulgence a comparatively small quantity may be sufficient to keep up the toxic condition. This is true, for example, of tobacco amblyopia, and was confirmed in this case by the rapid improvement after complete withdrawal of the toxic agent.

Such is the history of the case, of which the symptoms are entirely cerebral. At the first glance these seem to have no coherence or mutual relationship, but I shall attempt to show that they have a very direct relationship to one another and point to an affection of a special area of the brain. On analysing the symptoms which the patient described to the best of his ability as stupidity there were three prominent facts—(1) the peculiar difficulty in reading; (2) the inability to follow his employment of a tailor; and (3) the loss of memory for places. I will discuss each of these symptoms and finally see what relationship they have to one another.

The difficulty of reading complained of by the patient was a very peculiar one. He only read a few words and then came to an abrupt stop, saying that he could not go on. If he were allowed to rest a little he would again read a few words and stop just as before. I have already pointed out several features of this difficulty in reading which differentiated it from ordinary cases of asthenopia due to muscular insufficiency or some optical defect. There was no blurring or running together of the letters. The patient saw them plainly, but, as he expressed it, after a little he became stupid and they lost all meaning for him. The difficulty was entirely independent of the size of the letters and therefore had no connexion with diminished visual acuity. There were four important features which distinguished this case clearly from an ordinary case of asthenopia. 1. The rapidity of the onset of the difficulty. He always broke down after reading a few words. 2. The intensity of the visual disturbance. After breaking down he could not read a single word by any effort of the will or any optical assistance, and still the words and letters were seen distinctly by the patient. 3. There was no pain or discomfort in or about the eyes, but simply a sense of great

mental effort. 4. No error of refraction, no affection of the fundus oculi, no muscular insufficiency or any ocular defect could be discovered on the most careful examination. It was therefore evident that this difficulty of reading was not due to any affection of the eye, but to some disorder of the visual centres in the brain. In the case already referred to as having been communicated by me last year the patient with normal visual acuity was unable to read any printed or written characters with which he was previously familiar with the exception of Arabic numerals. Similar cases having been described ever since Kussmaul's article³ by the term "word-blindness," I adopted it as the most convenient word for briefly indicating the character of the case. Sir William Broadbent, in a critical note in *THE LANCET*⁴ on my paper, has remarked that "in his judgment the employment of the term 'word-blindness' has been misleading and unfortunate." Now I quite agree with Sir William Broadbent that the word has frequently been used by writers loosely with different meanings attached to it and therefore it has been frequently misleading. The fault, however, lies, not in the word, but in the fact that those who use it have not always a clear conception of what Kussmaul meant by it. By the term "word-blindness" is meant a condition in which with normal vision, and therefore seeing the letters and words distinctly, an individual is no longer able to interpret written or printed language. With a clear understanding of this definition there is nothing misleading about the term, which is a most convenient one for describing a group of cases, which, however, includes several different forms. All the varieties have this point in common, that the inability to interpret written and printed language is not dependent upon any ocular defect, but upon disorder of the cerebral visual centres. The case just recorded presents many striking points of difference from the case recorded by me last year. Both, however, belong to the group which embraces disorders of the cerebral visual centres and hence the present case has been described as a peculiar form or variety of word-blindness. Complete word-blindness involving absolute inability to interpret written or printed language (alexia) is due, as was pointed out in my last paper, either to a lesion in the visual memory centre, which occupies the left supra-

³ Disturbance of Speech, Ziemssen's Cyclopædia, vol. xiv., 1877.

⁴ *THE LANCET*, Jan. 4th, 1896.

marginal and angular gyri, or to a lesion which divides completely the fibres connecting this centre with the visual perceptive centres occupying both occipital lobes chiefly in the neighbourhood of the cuneus and calcarine fissure. But if the visual memory centre be itself intact and the conductivity of the connecting fibres be only partially impaired there may not be absolute inability to read (alexia), but there may be very great difficulty in interpreting written or printed symbols (dyslexia). The case under consideration seems to belong to the latter class. This peculiar difficulty in reading at once struck me as being precisely similar to that met with by Professor Berlin of Stuttgart in a series of cases and to which he has given the name "dyslexia." Professor Berlin, in a monograph⁵ on the subject, records six cases which had come under his own observation during a period of twenty years. In order to show the similarity of the defect in Professor Berlin's cases I quote very briefly his first case. On March 4th, 1863, Herr B——, sixty-six years of age, came to him with the complaint that for some little time he had been forced to abandon his occupation as the reading of printed and written characters had become so very difficult to him. On giving him Jaeger's test-types he read correctly the first four or five words and then returned the book with the observation that he could not read further. After a short pause he again attempted to read, but came to a standstill after reading a few words. This experience was repeated in each successive experiment. He had precisely the same difficulty with types of all sizes. He could not state exactly the reason he could not continue reading. There was no pain or discomfort in the eyes or their neighbourhood; the letters did not become dim or confused—he could simply not read further. The attempt to do so appeared certainly to be unpleasant to him, as after having read quickly the first few words without mistake he at once put away the book as if to free himself of something unpleasant. Neither the eye nor its muscular apparatus showed any abnormality on the most careful examination. Aphasic disturbances were not present nor was any other abnormality discovered. Professor Berlin wrote to the patient's medical attendant that as there was no disease of the eye and no muscular defect the difficulty of reading must be referred to a cerebral

⁵ Eine Besondere Art der Wortblindheit (Dyslexia). Von Professor Berlin in Stuttgart, Wiesbaden, 1887.

affection. The patient did not again come under his observation, but he learned through Professor Niemeyer that about six months later his opinion was confirmed by the development of further cerebral symptoms and the ultimate death of the patient with an apoplectic seizure. The similarity of this case to my own as regards the peculiar character of the reading difficulty is very striking, and these cases may be regarded as presenting in its most typical form the characteristic features of this disorder. Professor Berlin in his monograph records six cases and Nieden,⁶ Bruns,⁷ and Uhthoff⁸ have reported others. The term "dyslexia" applied to these cases by Professor Berlin is a convenient one and I have adopted it as describing the prominent symptom in my case. Professor Berlin regards it as a special form of word-blindness due to an interruption in the conductivity of the connecting fibres of the visual centre in the lower parietal lobe of the left hemisphere. This view has been borne out by post-mortem examination. On the whole, Professor Berlin says post-mortem evidence supports the statement that the anatomical seat of the lesion in dyslexia is to be found in the lower parietal lobe of the left hemisphere, which includes the supra-marginal and angular convolutions. Professor Berlin accounts for the phenomena observed by the hypothesis that the interruption of the connecting fibres is only partial, that the capacity for conduction is reduced to a minimum, and that the slight power of conductivity remaining is rapidly exhausted. This seems a plausible and probable explanation of the rapid failure in the patient's power of reading. In the great majority of cases dyslexia has been found to appear as an early and sometimes as the first symptom of grave organic disease of the brain. Even in such cases frequently the dyslexia gradually improved whilst other grave cerebral symptoms subsequently appeared, such as right-sided hemiplegia, disturbances of sensation on the right side, right lateral homonymous hemianopsia, and sometimes aphasia. All these later cerebral symptoms pointed to a lesion on the left side of the brain within the area between Broca's convolution, the arm and leg motor centres and the visual centres, and such cases frequently went on to a fatal issue. There is another class of cases referred to by

⁶ Nieden: Archiv für Augenheilkunde, fax. 2, 1887.

⁷ Bruns: Neurologisches Centralblatt, Nos. 2 and 3, 1888.

⁸ Uhthoff: Deutsche Medizinal Zeitung, 1890.

Professor Berlin where dyslexia sometimes appears—viz., in chronic alcoholics. In these cases he found that the disturbance gradually passed away when the alcohol was withheld. My case belongs to this category. The patient's habits, the continuous improvement when alcohol was withheld, and the non-appearance of any further symptoms of cerebral diseases all combine to confirm the opinion that the dyslexia was of *toxic* origin due to disturbed nutrition of the cerebral centres or connecting fibres from excessive indulgence in alcohol. We are all familiar with many of the common forms of nervous disorder due to alcoholism, such as paresis and paralysis of the limbs, paresis and paralysis of the ocular muscles, and a peculiar form of amblyopia characterised by a central defect in the field of vision, very similar to the amblyopia produced by tobacco. That it also profoundly affects the cerebral visual centres we know from the frequency with which excessive indulgence in alcohol gives rise to a temporary mental affection in which visual hallucinations and illusions are a prominent feature. The opinion that the difficulty in reading was dependent upon a disorder of the visual memory centre or of its connecting fibres was strongly confirmed by consideration of the other peculiar symptoms present in the case.

The complete breakdown in the patient's capacity to follow his occupation of a tailor presents a striking analogy to the failure in his power of reading. He had been known for many years to his master and fellow-workmen as a good tradesman and a quick worker. Yet for a considerable time before his dismissal he did his work not only in an incompetent manner, but like a man who was in a tailor's workshop for the first time in his life; he seemed to have completely forgotten the relative shapes and positions of the different parts which make up a garment, so that he made the most absurd mistakes, often sewing pieces of different garments together. He was only able to continue at work for a little while through the kindness of his fellow workmen, who had to direct him in every successive step what to do next. His sewing, too, was like that of a person who had never learned to sew, and was often so very bad that it had to be ripped up and finished by another workman. Finally, his employer dismissed him, as he was practically useless in the workroom. This transition of a skilled workman to a condition of helplessness can only be intelligibly explained in my opinion by failure of visual memory. A moment's consideration will show what an

important part visual memory plays in the exercise of this calling. The recognition of the different shapes of the various parts of a garment, and the relative positions in which they must be placed in order to complete the whole, is only possible through the exercise of visual memory, which has been gradually acquired by the previous experience of the workman. If this be lost then the individual is reduced to the condition of a man who has never learnt the trade. Even in simple stitching the visual memory comes into play and guides the complicated movements of hand and fingers. It is only by the failure of visual memory, in my opinion, that his conduct can be intelligibly explained. This view is strongly supported by a case reported by Dr. Hermann Wilbrand of Hamburg in his interesting and able monograph, "*Die Seelenblindheit*."⁹ His patient was a woman suffering from "mind-blindness," or, in other words, loss of visual memory. She was unable to recognise her friends, the familiar objects around her, or to remember places. The very rooms and furniture in her own house seemed all new and strange to her. She could not find her way about the town in which she lived, but required to be led about as if she had been in a strange town. Dr. Wilbrand particularly observes that she could no longer sew properly, an accomplishment in which she used to be proficient. When she tried it the work she did was of the rudest description, like that of a child's first attempts. Fine sewing and stitching, Dr. Wilbrand remarks, are comparable to drawing, and even in the hands of the most expert cannot be properly done without the supervision of the visual memory.

The third peculiarity of the patient was the loss of memory for places. He could never remember where he put anything and it was observed by his fellow workmen that a large portion of his time was occupied in looking for things which he had mislaid. He also suffered occasionally from temporary loss of memory for familiar localities, so that he frequently lost his way in parts of the town with which he had been familiar for years. The recognition of places and localities can only be accomplished by a constant comparison of the present visual impression with the vast storehouse of mental pictures of places preserved in our visual memory. If the individual be deprived of this form of visual memory then he becomes like a complete stranger in his own house or in the

⁹ *Die Seelenblindheit*, von Dr. Hermann Wilbrand, Augenarzt in Hamburg. Wiesbaden, 1887.

streets of his own city. This form of visual memory supplies us with a kind of mental picture chart, which enables us to find our way with unerring precision amongst scenes and places with which we are familiar. In the case reported by Dr. Wilbrand, and already referred to, this loss of memory for places was a striking symptom, and in my last paper¹⁰ some excellent examples of this form of failure of the visual memory were quoted.

Here, then, we have the history of a patient who could not read, who could no longer do his work as a tailor, and who occasionally lost his way in the midst of familiar surroundings. Yet the ocular part of the visual mechanism was perfectly normal, and as his visual fields were normal we may also infer that the visual perceptive centres occupying the occipital lobes were also intact. I think it is clear from our analysis of the case that all the symptoms manifested have this very direct relationship to one another—that they are all dependent upon failure of the visual memory. The intelligent exercise of vision is a very complex act of which we have as yet only very imperfect knowledge. To the successful exercise of the function the brain contributes as largely as the eye. The ocular defects in all their multitudinous variety have been studied for many years with great industry and success, but the cerebral disorders, which interfere with intelligent vision, have until recent years not met with the attention they merit.

Increasing knowledge of the cerebral derangements of vision, based on clinical and pathological observation, makes it clear that we must carefully distinguish between the visual perceptive centre and the visual memory centre. The perceptive centres situated in the occipital lobes, chiefly in the neighbourhood of the cuneus and calcarine fissure, enable us to have conscious perception of objects as occupying a definite position in the visual fields. Derangements of this visual centre are evidenced by defects in the visual field, which have all been carefully studied. But the act of vision is infinitely more complex than the simple perception of an object as occupying a particular position in the visual field. It involves complex judgments and, above all, a constant comparison of present visual impressions with the vast series of past visual impressions, the accumulated riches of our life experience which are stored up in a special cerebral area, the visual memory centre,

¹⁰ THE LANCET, Dec. 21st, 1895.

occupying the supra-marginal and angular gyri. Derangements of this centre are evidenced by the various forms of mind-blindness. The objects are distinctly seen, but they convey no information to the individual since they are no longer recognised by him. Word-blindness and loss of memory for places and objects are all simple varieties of mind-blindness. Clinical experience and pathology teach that word-blindness or loss of the visual memory of word symbols is due to a lesion in the visual memory centre on the left side of the brain. In most cases of word-blindness there is no interference with the other forms of visual memory such as those of places, of objects, of form and colour. When there is complete mind-blindness involving the loss of all forms of visual memory it is probable that there is a bilateral lesion involving the centres on both sides of the brain. In the present case there is nothing approaching to complete mind-blindness; but the loss of memory for places and the striking failure of that necessary for his employment, in addition to the peculiar derangement of the visual memory for letters, suggest the probability of some impairment of the functional activity of the right as well as the left centre. Nor is this supposition improbable when we consider that many of the nervous disorders due to alcoholism are bilateral, such as amblyopia and the ocular paralyses which are sometimes met with. It is a familiar fact that while alcoholism has a hurtful influence on the whole nervous system its toxic influence may manifest itself by attacking specially some particular nerve or group of nerves or even some particular bundle of nerve fibres. That it also impairs the activity of the cerebral centres as a whole is frequently shown by a general failure of the mental powers, but here it also may exert its baneful influence on some special cerebral area and produce a temporary cessation of activity or derangement of that particular centre. M. Michel Delines in an interesting study¹¹ has called special attention to this fact. In the case under consideration the visual memory centres seem to have been specially attacked or, as suggested by Professor Berlin, their connecting fibres.

The derangements of these visual memory centres have met with comparatively little study and are not generally known, therefore the vast majority of such cases escape observation and hence our comparatively scanty records

¹¹ M. Michel Delines: *Les Alcooliques, Psychologie et Physiognomonie*. Revue Encyclopédique Larousse, Paris, October, 1896.

regarding them. This is my apology for discussing the subject again at such a brief interval and at the risk of some repetition. The case just recorded forms an interesting sequel to my last and gives a clinical picture of another form of derangement of the visual memory. In this case the symptoms were only transient, being due to functional derangement caused by toxic influences; but in the vast majority of cases this form of visual derangement is a symptom of grave organic disease of the brain. Most important of all, it is a focal symptom pointing to disease of a particular area of the brain and it has already been used with success as a localising symptom in cases where surgical interference was indicated.

Glasgow.