An Address

ON

SOME APPLICATIONS OF EXPERIENCE GAINED
BY THE WAR TO THE PROBLEMS OF
CIVIL MEDICAL PRACTICE.READ BEFORE THE SOUTH MIDLAND BRANCH OF THE BRITISH
MEDICAL ASSOCIATION.

BY

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(Abstract.)

WHILE much of our war experience will, we hope, not be of civil use, in some medical diseases it will be of great value. May we this afternoon consider the chief of those which have come under my own observation?

THE HEART.

The war has not increased our knowledge of organic valvular disease of the heart, but happily, thanks to T. Lewis and his co-workers, it has been more widely diffused. A large experience of Recruiting and Invaliding Boards has shown me that there has existed a considerable divergence of opinion as to the fitness of the heart for muscular work.

Occasionally there was a failure to remember what has often been taught at the bedside for many years—namely, that what really matters is not so much the noise we hear on auscultation, but whether the heart is doing its work efficiently. Often the louder a murmur is, the better, for a loud murmur may mean that the cardiac muscle is strong. A man doing his work as a dock labourer had a valvular murmur which could be heard with the naked ear one yard from the foot of his bed; another man with a valvular murmur won a walking race from London to Brighton. Apart from instances of persons with valvular disease who can do full muscular work, there are numerous patients who get on very well and lead useful lives if their work is adjusted to that which the heart can perform without further damaging itself. The doctor is of the greatest use, for he can prevent the patients with valvular disease from doing too little or too much; he can help them to find out the limit of their power and see that they always keep just below it.

Sometimes it was not recognized that a systolic murmur is by itself often no evidence of valvular disease—for example, there are haemic murmurs, murmurs at the impulse which disappear when the patient lies down or takes a deep breath, and probably other varieties of functional murmurs. I have heard several thousands of recruiting appeals. Many of the appellants were in a low grade because, owing to a murmur, the heart was considered a bar to a higher category when really it was perfectly healthy, and the category might have been higher, although the appellant, believing he had heart disease, wished to be rejected altogether. In many departments of medicine and surgery the early recruiting boards varied so greatly in their standards that the Ministry of National Service issued "General Directions for the Guidance of Medical Recruiting Boards." Those of us who drew up the medical part of these had many helpers, and, with the aid of Dr. T. Lewis, it was laid down that if the man's occupation did not prove his capability for physical exertion, and there was doubt about this, the board should see how he responds to exertion, and the following test was recommended:

1. The man's pulse is taken while he stands at rest.
2. He hops twenty times with the right and then twenty times with the left leg, always lifting the foot 9 in. from the ground, without a pause.
3. Immediately after this the movements of the chest and of the *alae nasi* should be observed while the man's attention is distracted by conversation. In health there should be no noteworthy breathlessness, and no pallor nor anxiety of expression.
4. The rate of the pulse is taken two minutes after the exercise and while the man still stands. In health it should not be more than five beats more than it was before the exercise.

With regard to diseases of the heart the following recommendations were made:

Heart (Diseases of the).—In all cases the heart should be examined with the man in both the erect and recumbent position. A systolic murmur is not necessarily an indication of disease of the heart. Most systolic murmurs heard only at the base of the heart and systolic murmurs wherever located which disappear during sustained inspiration do not indicate cardiac disease. If a systolic murmur definitely indicative of mitral regurgitation is present, the man should not be placed in Grade I.

A man with a well-compensated mitral regurgitant murmur who shows healthy response to the exercise test already given may be placed in Grade II, unless he has recently had a well-certified attack of rheumatic fever.

A man with a mitral regurgitant murmur, and showing but slight enlargement of the heart and no signs of failing compensation—for example, oedema of the feet, dyspnoea on slight exertion—and who is able to follow his civil employment, may be placed in Grade III—sedentary.

Cases of mitral stenosis are, under the most favourable circumstances, fit only for sedentary work.

No man suffering from aortic regurgitation is fit for Grades I, II, or III. A systolic murmur at the base does not necessarily nor often indicate aortic stenosis. Aortic stenosis apart from regurgitation is rare, and cases in which it is suspected should be referred for special examination.

Enlargement of the heart always requires careful investigation. Examination to determine the size of the heart should always be made with the man lying down. A diffuse impulse is not to be taken as a trustworthy sign of enlargement of the heart.

Irregularity of the heart is not necessarily evidence of disease. Variations in the pulse rate with respiration and dropped beats are common irregularities and of no special pathological significance. They disappear when the rate of the heart is raised by exertion, irregularities indicating disease do not.

If it is suspected that a man has taken drugs with a view of altering the action of the heart, the examination should be deferred, and particulars of the case communicated to the Commissioner of Medical Services so that appropriate steps may be taken to arrive at a diagnosis.

A pulse rate up to 120 per minute is often, especially in youths, merely due to the excitement of examination, and in the absence of evidence of diseases producing a rapid pulse it may be disregarded.

In connexion with these recommendations I may add that by no means infrequently "dilated heart" has been diagnosed on insufficient grounds and the irregularity of the pulse due to extrasystoles has been regarded as serious.

It is especially important to think twice before telling a patient he has a weak heart, not only because by so doing we may restrict his or her work unduly, but also because there is no disease which the public hold in greater dread than heart disease; therefore if a patient considers his heart is weak, dilated, or diseased, when really it is quite able to meet all the demands likely to be made on it, he becomes obsessed with the idea his heart is not healthy. There are few more difficult to dispossess of an obsession than those who erroneously think themselves seriously ill with disease of the heart. Numbers of men have been made pathologically miserable because they believe themselves to have heart disease when they have not. To give one instance, a fine athlete, a gymnasium master, was totally rejected on account of a murmur and was told he had disease of the heart, but really the murmur was functional. He became morose, took no exercise, went about in fear of his life, and in a few months was suffering from serious mental depression and imagined he had all sorts of illnesses in addition to disease of the heart. Even then he responded normally to the exercise test. Surely it should have been self-evident that if he could do athletic feats with pleasure, the heart was for the object for which it was made—namely, pumping blood—quite healthy, and if he had been passed into the army he would not have become a case of depression very difficult to cure.

The chief applications of war experience to civil work are: The heart must be judged by the work it can do; it is the duty of the doctor to determine this and advise accordingly. Many systolic murmurs do not indicate organic disease; proper care must be taken before diagnosing a dilated heart. The commonest irregularities of the pulse are of no pathological significance. To tell a patient his heart is weak, dilated, or diseased, when it is not, may cause harm to him.

PLEURA AND LUNGS.

Several problems concerning injuries to the pleura and lungs have been of great interest, but fortunately such injuries are rare in civil medical practice. Our experience

of haemothorax has emphasized the necessity of draining the pleural cavity if the fluid effused is not sterile, and the tendency is now rightly to withdraw the fluid, even if sterile, unless the quantity is probably under 10 oz.; doing this helps the lung to re-expand quickly. Our object in pleuritic effusion is to get the lung back to normal as soon as possible, therefore breathing exercises should be begun early, usually directly after the fluid is taken out; when an empyema has been opened these exercises have the additional advantage of aiding the drainage of the pleural cavity. If the patient is up and about, walking, especially up a moderate hill, is the best breathing exercise. Do let us remember that if the fluid is infected, whether or not it is purulent, the chest must at once be opened. Delay means serious damage to the lung and pleura, and consequent difficulty in re-inflation. No empyema ought ever to be permitted to become large, and an Estlander operation ought never to be needed. The war has brought into prominence the question of the mode of production of pulmonary collapse in lungs not themselves directly damaged or diseased, but the cause of this is still under discussion. It occurs in many conditions, sometimes after operations on the abdomen.

EPILEPSY.

Few things in my war work have struck me more than the mistakes that have been made about epilepsy. A man, who passed into the army less than twenty-four hours before, was admitted into a military hospital suffering from a series of extremely severe epileptic fits, and he had had several fits before. Numerous appellants came before the recruiting appeal board who were epileptics, and numbers of epileptics have been invalided out of the army, having proved quite useless and unreliable. It is unfortunate that the epileptic has proved a difficult recruiting problem, for each passed in and subsequently invalided out cost the country many pounds in kit, food, and pension, quite apart from the harmful effect of army life on the patient. We are liable to forget that one person in every 1,500 in this country is epileptic, and that the proportion of epileptics is higher at the commonest recruiting age, for three-quarters of all cases of epilepsy occur in the first two decades and half in the second. The epileptic is a man of extreme instability of the nervous system, and is therefore particularly unfit to withstand the nervous stress of war—indeed, he is positively dangerous as a soldier, for not only may he have an attack at some crucial moment, but he may easily become insane. In a sense, the motor fit of an epileptic is much the same as mania, and the exhaustion unconsciousness after it is much the same as melancholia. Think, too, of the danger to everybody of the soldier afflicted with the automatism of epilepsy.

Petit mal is more likely to be overlooked than *grand mal*, and its attacks are at times either totally disregarded or they are ascribed to a weak heart. This is dangerous, for a person afflicted with *petit mal* is liable to severe epileptic fits, to mental aberration, to weak-mindedness, and is quite unfitted for a soldier, especially when we remember that alarm is the commonest excitant of an epileptic fit. It is important to bear in mind that the loss of consciousness may be only momentary and occasionally incomplete. Vertigo is a frequent symptom of these attacks, but loss of consciousness, apart from epilepsy, is extremely rarely associated with vertigo.

It was these considerations which made those who were responsible for the direction of medical boards make the following recommendations:

All cases of true epilepsy in which the diagnosis has been established, and in which there is definite evidence that the man has had an epileptic fit during the preceding seven years, should be rejected. Convincing documentary evidence should be supplied whenever possible, and the certifier should state whether he has seen an attack or its immediate results, and whether he knows of other cases in the family. The presence of symptoms of instability of the nervous system—for example, greatly exaggerated knee-jerks, mental deterioration, widely dilated pupils or tremor—should be regarded as sufficient corroborative evidence for purposes of rejection. If a man states that he is the subject of this disease, but no attacks have occurred for seven years, and there are no marked symptoms of instability of the nervous system, he may, if otherwise fit, be placed in Grades II or III. No man with a well authenticated history of epilepsy at any period of his life should be placed higher than Grade II.

I would plead that the lesson for civil practice that our army experience teaches is that we should be more on the outlook for epilepsy. To fail to recognize it is unfortunate, for not only do we omit to give the proper medicine, but we do not advise a suitable occupation, and many occupations are quite unsuited for epileptics.

NEURASTHENIA.

The word "neurasthenia" was employed so indiscriminately by those who appeared before recruiting boards that it lost its value to them. It was largely used by malingerers, shirkers, cowards, and *malades imaginaires*, amongst others; therefore boards were directed that attention need not be paid to it unless evident signs of nervous instability were present.

Taking the word "neurasthenia" to mean an exhaustion of the nervous system, in which continued emotion and preoccupation play a part, many more cases have appeared since the war began than we saw in times of peace, as might have been expected; but, when we consider the strain of the war, it speaks well for the British nervous constitution that neurasthenia was not more common. We all know what sailors, soldiers, and airmen have done, and the way in which innumerable civilians have worked has been astounding, and many who have filled me with admiration have been doctors. Thousands of men and women have been without holidays, have worked Sundays as well as weekdays, have taken great responsibilities, have undergone deep emotion, and have come through the four and a half years all right.

Although we cannot express nervous work in terms of calories, the war has taught us emphatically that there is such a thing as nervous exhaustion. This war has been so particularly horrible with its high explosives, aeroplane bombing, huge mines, and gassing and submarines, that the nervous system has been strained to an extent not reached in previous wars. Hence the number of neurasthenics has been large.

For every one man among the rank and file five officers in the army have been affected with neurasthenia. The proportion among officers is really much higher, as there are many fewer officers than men. This high proportion is due to the greater strain on the minds of officers. The men have simply to do as ordered, but the responsibility for success or failure rests with the officers, who have usually been young, and further, as many have told me, they have felt acutely that the lives of their men depended upon them.

The following description of war neurasthenia, derived from experience of my own patients and from accounts written by others, is, I think, correct. The circumstances which usually predispose to it in war time are much the same as in peace, but considerably more severe. Bodily fatigue, long hours of duty, shortage of food or drink, great exposure to wet and cold, are some of them, hence every effort has been made to avoid subjecting officers or men to these. But the most potent cause is mental fatigue, and the circumstances which lead to it in officers are constant anxiety and great responsibility, the need to be always on the alert and to be ready to make a quick decision on which momentous results depend; and it must be remembered that many of the officers are little more than boys, and yet for the sake of the men they must subjugate their own feelings and inspire confidence. The extreme desirability of lessening this mental fatigue is well recognized, and consequently the soldier is made as comfortable as possible, and when off duty restful means of amusement are provided.

The first evidence of impending neurasthenia is irritability, difficulty of concentration, a tendency to start at a sudden sound, and the condition is well described by one writer as jumpiness. Next, sleep comes tardily, the sufferer is restless, and, although awake, conjures up the experiences of the day, especially if they have been horrible, and when he falls asleep he is not much better off, for he dreams vividly of battles, explosions, and killing; these dreams lead to considerable nervous exhaustion, so that he wakes tired, reminding us that in seeking for a cause for this complaint in civil life we should always inquire as to dreams. As days pass on his mental fatigue increases, all the above symptoms become more manifest, he begins to suffer from fear, although previously courageous, he is constantly thinking of horrible sights, and is longing

for the war to end, or at any rate that he may be out of it, and hence he welcomes some wound that incapacitates him, or still more often he hopes he may be killed, and this state of mind will lead to reckless bravery. By this time a complete breakdown is near at hand, usually it is brought about by some incident of war which may not in itself be serious, such as a shell explosion or gassing, and the patient, who has generally lost flesh, looks anxious, his eyes are often a little prominent, he cannot concentrate his mind, he is extremely jumpy, probably tremulous, eats badly, sleeps badly, dreams horrible dreams every night, and ought to be sent to a hospital.

The treatment that our experience of the war has shown to be best for neurasthenia is that which should be used in civil life. The patient must be removed to quiet surroundings; he must rest, and if severely ill is kept in bed; he must have good plain food so as to slowly gain weight; and he must sleep, if possible without drugs; mere suggestion that sleep will come in the quiet of a hospital is often effectual; or a hot bath may be tried; if these fail, a little bromide or trional may be given, for sleep is essential; but, if given, soporific drugs must be rapidly gradually diminished; the patient must on no account be taught to depend upon them; opiates must never be used. After a day or two in hospital the doctor should kindly assure him that he will get well, and that he will not be sent back to work till he is well. Talk should never be about his past war experiences; visitors and nurses should be warned of this. We all know and have been made angry by the distracting kindly visitor who puts a patient back by saying, "Now do tell me how it all happened." This helping him to forget his war experiences must be carried out in his surroundings; he should not be in a ward with those badly wounded; and even if the medical officer is a colonel and the patient a lieutenant, the doctor should treat him as he would in civil life—that is, as a friend on an equal footing. Great care must be taken to show that we believe him to be recovering, and not to foster invalidism, so that early, an easy game at cards or light reading, is of great help. As soon as possible he should get up and take a little exercise, such as playing croquet, but he must never carry exercise to the point of fatigue. Whatever he does which turns his mind from the past and at the same time gives him confidence, is invaluable; therefore he should soon be allowed out a little, and for the quiet and country surroundings, a country convalescent home at this stage will accelerate recovery, not only in itself, but because the patient feels that he would not be sent to it unless he were progressing. But in every detail the same care to obliterate his war experiences, not to fatigue him, and to encourage him, must continue there. Sometimes his own home is a good place for him; often it is not, for his relatives may be extremely foolish, and will not carry out the principles just enunciated. Whether the case is slight or severe recovery depends very largely on the doctor; the man who makes a hurried or a pompous round is no good, but he who will take the trouble to show a real interest in his patient, and who will spare time to talk with him properly will be able to cure most, if not all, the cases of neurasthenia, and he will have his reward.

The neurasthenia of the civilian is the same, but less severe; he cannot concentrate, his brain will not work, he forgets, loses interest, and later on his sleep; he becomes dyspeptic and thin. The worst signs are insomnia and wasting, these call for prompt and drastic treatment. Hard work during the war caused many serious cases among civilians, but the treatment of them was, with obvious modifications, the same as for officers.

The war ought to have made all doctors more interested in neurasthenia than some of us have been. It has been said that in ordinary civil practice the absence of organic symptoms, the constant complaining with apparently little justification, the frequent relapses alternating with recovery up to a certain point, the time and attention needed for their cure, has made some doctors neglect their neurasthenic patients, many of whom have been set down as malingerers or as sufferers from imaginary ailments. Neurasthenic and hysterical patients are at least as entrancing a study as those suffering from serious organic disease, and have the great advantage of being capable of cure; yet many doctors will not occupy themselves nearly so much with them as with those afflicted with, say, malignant endocarditis or cancer of the liver. Further, we have been

reminded that we should restrict the term to genuine cases; at present its use is often quite unjustifiable.

HYSTERIA.

It is impossible to say whether hysteria has increased since the war, for we do not know how frequent it was before, and many cases formerly regarded as afflicted with hysteria would not, according to some modern definitions, be regarded as suffering from it. Nevertheless, the war has emphatically called our attention to this fascinatingly interesting disease. Gowers used to say that 20 per cent. of women were potential hysterics, but the disease is certainly rare in civil life among men, although since the war there have been very many cases among soldiers.

These cases lend no support to the sexual hypothesis of hysteria fashionable before the war, and most are agreed that they can be explained best either by the hypothesis that hysteria is due to suggestion or by the hypothesis that in the hysteric the supraliminal consciousness is, in part, dormant, and it may be that both suppositions are correct.

That of suggestion has done great good by calling the attention of doctors to the fact that they must not suggest symptoms to the patient. Babinski is undoubtedly right in saying that doctors—and I would add nurses—suggest symptoms to patients. This is reprehensible and never ought to be done. To give two instances: A doctor sent a patient to a distinguished physician, now dead, who replied by letter saying he could find nothing wrong, but that the patient should be watched, for he was the kind of man that might later suffer from arterio-sclerosis and granular kidney. The doctor read this to the patient; he has been miserable ever since. Hearing the letter read suggested to him the symptoms of renal disease, with which he then made himself acquainted by reading; he is now constantly complaining of pain in the lumbar region, tests his urine weekly, and is always looking for oedema of the ankles. I have known a nurse say to a woman, who certainly had no signs of malignant disease: "It is a curious thing, but the last patient I saw with symptoms like yours had cancer." This, as might be expected, had dire results.

The war has reminded us that traumatism may lead to hysteria in at least two ways. A wound of the arm, for example, may suggest paralysis or contracture of it, and such cases, as has been shown particularly by A. F. Hurst and his co-workers at Seale Hayne, can usually be cured by persuasion and re-education. A good instance of this is that large numbers of men who were gassed suffered from hysterical symptoms, generally spasm of the eyelids, aphonia, or vomiting. Sometimes these cases have been deemed incurable, and have been pensioned out of the army as such, for it has not been recognized that the symptoms are hysterical and readily curable. No doubt in all these and allied cases the auto-suggestion causing the paralysis or other hysterical symptoms was rendered easy because the terrifying experiences of the war diminished the reliability of the supraliminal self. But apart from this, actual damage to the brain itself may diminish the power to resist auto-suggestion, and shell explosions apart from direct traumatism may, as Mott has pointed out, damage the brain by (1) commotion from aerial compression, (2) concussion, (3) decompression by embolism of bubbles of N or CO₂, (4) inspiration of CO, (5) inhalation of noxious gases. Not only may many symptoms following an injury be hysterical, but so may many symptoms in organic disease especially of the nervous system. A woman under my care for a tumour of the brain, diagnosed during life and found at the autopsy, some days had anaesthesia of one half of the body; this would disappear to be found again on the other half. For many years I have constantly taught students to try to separate the hysterical symptoms from those due to organic disease of the nervous system in the same patient. They may be found in almost any of such diseases, even organic hemiplegia, and are perhaps especially common in disseminated sclerosis. It goes without saying that we must be equally on the alert not to ascribe to hysteria symptoms due to organic disease.

The large number of soldiers, with or without wounds, suffering from hysteria has stimulated our zeal in curing it. Formerly, perhaps, our predecessors did not devote as much thought as they might to this, and young ladies were suffered to go for years suffering from the vapours,

as it was then called. In the first place, the patient's general health must, if necessary, be improved, for hysteria is liable to occur in those in whom it is below normal. Secondly, the treatment must be begun as early as possible, for, quite apart from its being always wise to get a patient well quickly, the longer hysteria lasts the more difficult it is to cure. Thirdly, as just mentioned, the doctor must most carefully avoid, by his mode of examination and by his wording of questions, suggesting symptoms. Visitors and nurses must also avoid suggestion. Nothing is more heartrending for the doctor than the well meaning visitor, who says: "Poor man! what a terrible time you must have had! The wonder is you have any power left in your legs." A sentence such as this will undo hours of hard work on the doctor's part, and it is because of this constant liability to the suggestion of new symptoms that it has been found advisable to treat hysterical soldiers in special hospitals where it is understood how to manage them, and where they are encouraged by seeing other patients getting well. This is an extremely influential part of the cure. Fourthly, and most essential, is the reawakening of the supraliminal consciousness and the making of suggestions powerful enough to overcome the hysterical symptoms. Sometimes this is not performed by the doctor. A soldier was invalided from the front for mutism; he had not spoken for weeks. He was playing draughts with another soldier, who cheated. The mute broke out in a torrent of abuse, and spoke ever after. A woman had lain in bed for years owing to hysterical paraplegia. The house caught fire; she ran downstairs fast enough to save her life. Hypnotism was employed for this part of the treatment, but is not at present much used as it is unnecessary. Persuasion and re-education are now largely practised, with excellent results. Men who have not been able to use one or other of their limbs or straighten their backs lose their disability in quite a short time. The medical journals, books on war neuroses, and the studies from the Seale-Hayne hospital give details of many cases. It is necessary that the doctor should convince the patient that a cure can and will be effected. Many employ electricity as a means of suggestion. We use at Guy's an effervescent mixture containing asafoetida and valerian; it is successful in many cases of mild hysteria; it acts by suggestion that it will cure, especially as the patient eructates into her mouth asafoetida and valerian during a great part of the day, and is therefore constantly reminded that she is going to be cured. The Weir Mitchell treatment, which often works wonders in the wasted hysterics, illustrates these principles. The general health is improved by the overfeeding and massage, the isolation removes the patient from the suggestions of her friends and her old surroundings, and a skilful doctor and nurse avoid suggesting new symptoms and devote their energy to suggesting to the patient that she will recover.

I trust the war has shown that we ought to give our best attention to hysteria, for the study of it is a pleasure in itself. It is very common; if you doubt this go to Lourdes. It is capable of cure; it is not, as some people seem to think, malingering. Remember Sir James Paget's famous saying: "The patient says she cannot, the friends say she will not, the doctor says she cannot will," and it is a curse to the patient, her friends, and her relations. Do you recollect what Fielding says in *Amelia*:

"These fatigues added to the uneasiness of her mind, overpowered her weak spirits, and threw her into one of the worst disorders that can possibly attend a woman—a disorder very common among the ladies, and our physicians have not agreed upon its name. Some call it a fever on the spirits, some a nervous fever, some the vapours, and some hysterics."

"Oh! say no more," cries Miss Matthews, "I pity you, I pity you from my soul. A man had better be plagued with all the curses of Egypt than with a vapourish wife."

GUERRERO, DOMINGO and ARGÜELLES have confirmed, in the *Philippine Journal of Science*, vol. xiii, the value of tartar emetic in the treatment of yaws in the manner described by Castellani in our columns on October 21st, 1916. The dose used was 1 grain. The number of doses varied from 15 to 18, and in those cases which recovered the medication was continued for five to twenty-seven days. Complete recovery took place in about two-thirds of the cases. In some symptoms diminished, but in others no improvement was observed. In five cases relapses occurred in from two to five months after the lesions had entirely healed.

The Montgomery Lectures

IN

OPHTHALMOLOGY.

DELIVERED IN TRINITY COLLEGE, DUBLIN, JUNE, 1919.

BY

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LECTURE II.—DISTURBANCES OF VISUAL SPACE PERCEPTION.

WHEN my eyes fall on any visible object, as on this piece of chalk on the table in front of me, I perceive it and I can in addition form certain judgements on its spatial relations to myself and to other visible objects; and if it happens to be similar to something I have seen before I can recognize its nature. That is:

1. I can determine its position in space in relation to myself and consequently point to it if I can control and direct the movements of my arm.

2. I can also form an approximate estimate of its distance from me and therefore touch it if it be within my reach, or move immediately to it if it be further from me.

3. And if another object be within my field of vision, as this second piece of chalk, I can form an approximately correct judgement of the relative positions of the two, that is, whether the one is higher or lower, to the right or the left of, or nearer or further than the other.

4. When one of the objects casts its image on the periphery of my retinae I can move my eyes so that it comes directly into central vision, and, if it is within a short distance, converge and accommodate too so that its image is focussed accurately on my maculae.

5. I can estimate its size, both absolute and relative to that of other objects.

6. I can recognize that it has thickness and depth, or in other words that it is tridimensional.

7. Finally, I can identify it, that is, associate its visual perception with the memory images of similar or allied past impressions, and with other qualities that I have learnt by previous sense experience, as weight, brittleness, etc.

All these judgements that I can form about this piece of chalk, which has merely thrown an image on my retinae, may be disturbed, either individually or collectively, by cerebral lesions. To-day I intend to neglect disturbances of identification which are generally called visual agnosia, and to restrict discussion to affection of the spatial attributes that we associate with the visual perception of the object.

We must, however, consider briefly how we localize in space objects which we merely perceive by vision, and how we attain the spatial attributes with which we endow our visual perceptions. This has been the subject of much discussion. The two chief explanations are those that have been offered by the nativistic and by the empiristic hypotheses. The nativistic view attributes localization in space to innate properties of the sense organs or sensory centres, properties which are inherited and ready for use by the newly born animal. According to the empiristic school, on the other hand, all space perception is of intellectual origin and is acquired only by habit and experience, by the testing and controlling of visual sensations by tactile, muscular, and other sensations from all parts of the body. This empiristic view is of considerable interest here, as it was first put forward more than two hundred years ago by George Berkeley, then a Fellow of this College, in his celebrated "Essay towards a new theory of vision." A study of the disturbances and dissociations produced by disease may in this, as in many other subjects, contribute towards the solution of the problem, though it cannot by itself settle it.

During the late war I was able to observe eight men with gunshot injuries of the brain who had disturbances of spatial orientation. All presented more or less similar symptoms, and as most of them remained under observation for considerable periods it was possible to investigate them repeatedly. The detailed observations on seven of these cases have been published elsewhere.¹ These disturbances cannot be attributed to blindness or amblyopia,