Colour perception and other visual functions in their practical aspects / by Freeland Fergus.

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COLOUR PERCEPTION AND OTHER VISUAL FUNCTIONS IN THEIR PRACTICAL ASPECTS.

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THE editors of the *Glasgow Medical Journal* have done me the courtesy of inviting me to write a short communication on the important subject of colour-blindness, particularly in its practical aspects. I have gladly availed myself of their invitation, because it affords me an opportunity of reviewing for my own benefit, and I trust also for the profit of the readers of the *Journal*, a controversy in which to some extent I may be said fifteen years ago to have led an all but forlorn hope. Time, however, has been on the side of truth, and to-day the Board of Trade will have to reconsider the whole of their regulations concerning colour testing. My interest in the subject of colour perception was first aroused when I was a post-graduate student in the laboratory of Donders. He was at that time engaged in an endeavour to prove the truth of the Young-Helmholtz theory of colour vision, and a great part of my time was spent in conducting experiments under his direction and in amassing a considerable amount of statistical information. The instrument which he employed was a differential spectroscope; each collimator was fitted with a Helmholtz diaphragm, so that the amount of light admitted to each spectrum could be decreased or augmented at pleasure.

By this arrangement the luminosity of the two spectra could be altered. Thus, it was possible to make any portion of the lower spectrum of about the same degree of luminosity as another portion of the upper one, so that the element of the difference of luminosity was largely eliminated. When these precautions were adopted, it was found that

many persons who had passed all the ordinary tests for colour-blindness were defective. This experiment of itself was sufficient to prove that in judging of colour the pigment is not the sole factor. No doubt it is the most important one and the most essential, but there are other elements which the person being examined may unconsciously take into the estimation. With the differential spectroscope it was possible to place any portion of the one spectrum above any portion of the other, and when that was done and the light was adjusted so that the luminosity was practically the same for each, then a number of persons who had passed all other tests, such as Holmgren's wools and ordinary spectroscopic testing, were found to be defective. The question which then suggested itself to my mind was as to whether a person who was in the ordinary sense colour-blind might not have sufficient perception of colour to be able to perform with safety all the duties of navigation.

This question recurred to me when about the year 1895 the Board of Trade suddenly increased the severity of its regulations as to eyesight tests. Their action was based very largely on a report drawn up by a committee of the Royal Society, and which very naturally was taken by the Board of Trade as being perfectly authoritative. It is only since the celebrated case of Trattles that they have been compelled to listen to the other side. On my again beginning the study of the subject, two instances speedily occurred which showed me that there was probably some truth in the view which I was inclined to adopt, namely, that all colour-blind persons are not dangerous for navigation. The one was the case of a lad who was just finishing his apprenticeship at sea, and who had never once during the whole time of his career mistaken a ship's light. I asked him to procure a certificate to this effect from the master mariner with whom he had served, and the following was at once granted:—

SHIP "M'MILLAN,"
GLASGOW, *18th April, 1895.*

This is to certify that Neil M'Millan has served his time under my command. During the whole time of his apprenticeship I have never known him to make a mistake in distinguishing between red and green lights.

(Signed) ROBERT GUTHRIE, *Master.*

The other case was that of a young gentleman, a student at Oxford, who was most unquestionably colour-blind, and

yet in my presence one night, standing under the clock in St. Enoch Station, he read, quite accurately and without hesitation, all the signal lights, and they are not few, that can be seen from that situation. I therefore came to the conclusion that I was probably right in my opinion that most colour-blind people are perfectly fit for the ordinary duties of navigation. I never said, and I have never believed, that all colour-blind people are safe.

At that time it seemed to me, with all possible respect to the committee of the Royal Society, that their work proceeded on an essentially erroneous basis. Mention was made in their report of such things as green-blindness, and red-blindness, and violet-blindness. Now, the plain fact is that these are all supposititious conditions, about which no one living knows anything. But even if these speculations were regarded as true, Captain Abney's empirical illustration, taken from his own book, strengthens the evidence in favour of the idea that colour-blind people are safe. The green or greenish-blue light of a vessel is composed of glass, the hue of which is very much that of the part of the spectrum in the neighbourhood of the F line of Frauenhofer. The port light, on the other hand, is as near as may be the C line. Now, if we take the spectra for green-blindness, red-blindness, and violet-blindness, according to Sir William Abney's own diagram, then in each the C portion of the spectrum differs absolutely from the F portion, which, if we take Sir William as authoritative, is itself sufficient proof that the colour-blind person is, under ordinary circumstances, safe for navigation.

So far as they could be obtained, statistics were found to bear out my contention.

I went carefully into the returns published by the Board of Trade as to candidates who had been prevented taking promotion on account of its being discovered that they were colour-blind. Thus, taking the report on the colour examinations for fifteen months ending with 31st August, 1894, which is the last report based on the old examination by means of colour cards and colour glasses, from that return we learn that during these fifteen months six men who held second mates' certificates were rejected; their average of sea service was eight years. Similarly, eight men who held first mates' certificates, having an average of fourteen years' service, were rejected. Four masters who came up for colour examination were rejected, and that with an average of twenty-four years' service. It is to be observed that in the report no mention

was made whatsoever of these candidates ever having been in a collision, nor is there any well authenticated case on record of a calamity at sea having been caused by defective colour sense. The only case that is referred to by the committee of the Royal Society is the very doubtful one of H.M.S. *Iron Duke.*

Our contention is, that so long as a man can infallibly, and in all conditions of weather, identify a masthead light, a port light, and a starboard light, he is quite safe for purposes of navigation. The difficulty has chiefly arisen from the matter being looked at purely from a laboratory point of view. It is not a laboratory experiment in a certain department of physiology, namely, in the department of the perception of colour about which so little is known, but it is a question as to whether a given man can determine three different lights, namely, red, green, and clear. Supposing a candidate were required to distinguish three different notes as to pitch, such as a high note, a low note, and one about halfway between the two, would it be reasonable to ask him to have the knowledge of tone which is requisite to tune a violin? That is practically what is demanded of the modern sea officer in relation to colour. Probably the height of fanaticism was reached in the matter when an edict was passed that not even a stoker in the Royal Navy was to be engaged whose colour sense was defective. We wonder if they extended their regulations also to the cooks in H.M. fleet, for surely a good colour sense would be as important to a cook, so that he might know when the captain's chop was done to a turn, as it would be to a man whose occupation is to shovel coal?

The report of the Royal Society's committee was based entirely on the Young-Helmholtz theory of colour perception. Now, the truth is that colour perception is only a thing which can be known immediately, and about the physiology of which we know little or nothing. The most recent researches of which we are aware are the very interesting observations of Dr. Burch, to be found in the *Journal of Physiology* (vol. xxii). His observations are so important that we offer no apology for quoting them *in extenso*, all the more so that they are short:—

EXPERIMENTS OF ARTIFICIAL TEMPORARY COLOUR-BLINDNESS.

BY GEORGE BURCH, M.A.

By exposing the eye to monochromatic light of great intensity it is possible to fatigue one or more of the colour sensations to such an

extent as to induce a condition closely resembling colour-blindness. During the continuance of this state the same mistakes are made in matching Holmgren's wools as by a colour-blind person.

For mere purposes of demonstration, it is sufficient to focus the sun's rays through a suitably coloured glass on to the pupil of the eye until the effect is produced, but for the systematic investigation of the phenomenon it is necessary to employ a train of prisms.

I generally use a large spectroscope in which only about a tenth of the spectrum is visible at one time, opening the slit very wide, and, after dazzling one eye with the practically monochromatic light, observe the appearance of a spectrum of ordinary intensity. The following four colours, viz., red from A to B, green from near E, blue about halfway between F and G, and violet between H and K, produce well-defined characteristic results, while the effects of light from other portions of the spectrum are of a more or less intermediate nature. In each case all direct sensation of the colour used for fatiguing the eye is completely lost, but the positive after-effect remains as a luminous fog, by which the hue of all other colours is affected if they are relatively faint, but which is unnoticed if they are bright. This effect is strongest in the violet and weakest in the red.

I have attempted to represent the principal results in coloured diagrams, but find it impossible to match the exact hues.

After light from A to B all sensation of red vanishes. The spectrum begins between C and D with pure green. The blue and violet are unchanged in extent, but look a trifle warmer in tone.

After light from D all sensation of both red and green vanishes, the spectrum beginning with blue just beyond the B lines. The violet looks very brilliant, and extends quite as far as usual.

After light from E all sensation of green vanishes, and the red meets the blue and overlaps it between B and F. There is a strong subjective green glare which, if the slit is nearly closed, makes the red look orange and the violet dull and dirty, but on opening the slit the red resumes its natural colour.

After light from about halfway between F and G all sensation of blue vanishes, the violet meeting the green and overlapping it at about the same part of the spectrum. There is a strong subjective blue glare, making the red look slightly crimson with a narrow slit. The violet extends as far as usual, but is more ultramarine in tone.

After light from between H and K all sensation of violet vanishes, the spectrum ending with a pure blue of great brilliancy about midway between G and H. The green and red have their usual limits, but with a narrow slit the red appears bright purple and the green almost white.

During the condition of blindness to any one colour it is possible to blind the eye to any of the remaining colour sensations.

Thus, after light from A to B, combined with light from G to K,

only the green sensation is left, the spectrum extending strongly from D to F, and more faintly to C in the one direction and nearly to G in the other. Similarly, after light from G to K, followed by light from E, only the red sensation is left. It extends from A to a little beyond B.

These observations indicate that in my own case, as also in about seventy persons whom I have examined by a modification of this method, there are four primary colour sensations, viz., red, green, blue, and violet. I have not found any trace of a separate sensation of yellow. If it exists it would constitute a fifth colour sensation.

So far as Dr. Burch's researches go, they seem rather to confirm the Young-Helmholtz view of colour perception, but it will be remembered that the Young-Helmholtz theory predicates only three primary colour sensations; and, further, it must be remembered that any two colours which are complementary to each other make up white light. The whole question, then, of colour perception seems at present undetermined, and we cannot but regret that so eminent an authority as a committee of the Royal Society of London should have issued a report, involving the most serious consequences to a number of seafaring men, on a theory of colour perception which is at best but a mere supposition, and one which, if Dr. Burch's experiments are reliable, and there is no reason to doubt it, is erroneous. A considerable number of men have had their careers ruined as a consequence of the report of that committee and the action which the Board of Trade naturally and, we think, necessarily, took upon it. The very ingenious researches of Dr. Burch seem to us to have entirely disproved the Hering theory of colour perception, for the exhaustion of one sensation did not arouse the complementary, as we would have expected it to do had the Hering theory been true. The summation of our present knowledge of colour perception seems to be this, that the Hering theory of assimilation and dissimilation of three pairs of colour sensations has been disproved. According to the Young-Helmholtz theory there are three primary colours, and out of combinations of these all possible colour sensations can be derived, as also white light. Dr. Burch distinguishes four primary colour sensations, from combinations of which all other colours can be derived, as also white light; and, finally, we have the well-known fact that any two complementary colours, when mixed in suitable proportions, make up white light.

We are confident that many colour-blind people in the past have navigated with safety. It is said that between

4 and 5 per cent of men are colour-blind, and before any regulations were passed at all 4 or 5 per cent of the vessels at sea must have been in charge of persons suffering from colour perception defects. Yet there is no record of disasters at all comparable with such a state of affairs. Had it been possible to have quoted disasters due to colour defect we would have had numerous examples given to us. It is probably not wide of the mark to say that there is scarcely such a thing as a well authenticated case of one life that has been lost from a defective colour sensation. Many have been lost from men in charge of steamers or trains indulging in alcohol, and yet the Board of Trade has never issued a regulation that before a man obtains a certificate as captain or mate he must be a teetotaller of approved reputation. It is largely a case of straining at a gnat and swallowing a camel.

We wish distinctly to say that a man who even hesitates as regards the recognition of coloured lights is a danger to navigation. He is most likely to be the first to find it out and to abstain from trusting himself. Many a man who is in the incipient stages of tobacco amblyopia has come to us saying that he is no longer fit for his duties at sea because he has a difficulty in recognising colours. When a man has a difficulty in recognising colours he certainly ought not to be the officer of the watch, but there is no other duty at sea for which, so far as colour is concerned, he is not suitable.

But the thing we wish to insist upon is, that a very large number of persons who are congenitally colour-blind are perfectly able, and that without the slightest hesitation, to distinguish the three sensations given to them by red, green, and clear light.

Probably all congenitally colour-blind people have this power so long as their light sense is good. It is impossible to say how they manage to distinguish colours so accurately, but we cannot help thinking that the difference of luminosity which these colours have in practice may have a great deal to do with their being able to recognise them. It is also possible, although scarcely conceivable, that the thermic effects may have something to do with the matter; but however it arises, the fact remains that for the most part they have the power of distinguishing the lights as indicated.

The test, then, should not be a laboratory experiment, ingeniously devised for the purpose of investigating colour sense. If no injustice is to be done, and if candidates who are perfectly fit for their work are to be allowed to continue the profession of their choice, then the tests must be sufficient,

but should be practical in character. It will suffice so long as a man in actual practice can infallibly distinguish, in all conditions of the atmosphere, the three lights used at sea.

Probably a lamp such as that devised by Dr. Grossman, of Liverpool, is one of the best practical tests. In this apparatus are glasses of the same colours as the sidelights of a ship, and the aperture is of such a size that the image formed on the retina is about the same size as the image formed by the sidelights at ordinary distances. It seems to me that Dr. Grossman's lantern contains all that is necessary to determine whether a particular candidate is or is not fit for navigational duties. If, on testing him with Dr. Grossman's lamp, the slightest hesitation is manifested, then I would reject the candidate; but I would not reject him because he had failed in Holmgren's wools, in spectroscopic testing, or in other laboratory work. The only drawback to Dr. Grossman's apparatus is that we are constantly met by the assertion that although a person may be able to distinguish lights in clear weather he might not be able to do so in a fog. We believe that that supposition is not well founded. The colour of any light is a function of its frequency, and there is ground for believing that a fog, short of preventing a light being seen, has very little, if any, effect on the frequency. So far as my own observations are concerned, and so far as I have been able to ascertain from others, the red and the green light do not appear at all altered by fog to those who have fairly normal colour perception—that is, the frequency is not materially altered. There is no reason to suppose that a moderate degree of fog, such as will admit of the light penetrating, or, at anyrate, penetrating easily, will make a difference to the frequency. At the same time it is to be admitted that dense fog, which still allows the sun to be seen in the heavens, considerably alters its hue. The red light penetrates even through a fairly dense city fog, and seems to have a greater penetrating power than the blue components of sunlight. I do not wish in the least to be dogmatic. Some people doubt the ability of colour-blind persons to distinguish sidelights in even a moderate degree of fog. I, personally, have none; but it is beyond dispute that an apparatus such as Dr. Grossman's is not altogether a satisfactory test from this point of view. I would be inclined, therefore, where there is any remaining dubiety, to send a candidate to sea for a matter of a year under the special observation of a trustworthy sailing master or mate. If during that time he has reported lights accurately, unhesitatingly, and well, as almost

all colour-blind persons will do, then I would certify him as being fit for navigational duties. Persons with even the most normal colour perception occasionally have difficulty at great distances in identifying the particular hue of a light. Even in the most normal, colour perception seems to be a relative rather than an absolute matter, and the whole question comes to be the definition of the area of safety. I think that so long as a man has absolutely no difficulty in distinguishing the three lights, then, let colour perception, from a laboratory point of view, be what it like, that man is perfectly safe.

The relationships between colour sense, light sense, and form sense have not been thoroughly investigated. A deficiency of the light sense strikes me as being a far greater danger to navigation than a defective colour sense. Many a ship has been wrecked because on a dark night the loom of the land has not been seen. The perception of objects on a dark night is entirely a function of the light sense, and although this part of vision is of such great importance, so far as we are aware the Board of Trade has made no suggestion that this function of vision should be tested. For pilotage in narrow waters a good light sense is of the very first importance. Without it the danger is great.

This function of vision has a twofold aspect. Clinicians and physiologists are in the habit of talking of the light difference sense and of the minimum light sense. To test the former, two sources of light of equal intensity are taken. The person being examined steadily looks at them, and while he is doing so the intensity of one is increased and that of the other diminished. The observer indicates whenever he has been able to distinguish the slightest difference in the illumination, and the point at which this has occurred for any individual is noted on a scale. In testing the light minimum sense the patient is required to look into a dark box, which has on the side opposite to that at which his eye is placed several suitable test objects. Light is admitted by means of the gradual opening of an iris diaphragm until the patient can distinguish the test objects. The size of the opening of the iris diaphragm, which has been required to allow him to distinguish these objects, is a measurement of his minimum light sense. In such investigations it is necessary that the source of light be a constant, therefore daylight is not suitable. The illuminant should always be a Board of Trade standard candle, or some other constant source of light. To get reliable results, it is well to keep the

patient in a perfectly dark room for at least half an hour before the investigation is made. A defective light sense in either of these aspects ought to disqualify a man as an officer of the watch or a lookout. The clinical aspects of defects of the light sense are at present by no means well worked out.

There are, of course, some diseases where such a defect is well recognised, *e.g.*, retinitis pigmentosa, but there are many other conditions in which it exists. There is a frequently accepted opinion that most persons who are the subjects of acquired syphilis have a defective light sense. Whether this opinion is well founded or not we cannot say, but it seems to us certain that where you have a defective light sense, combined with defective colour perception, you have a form of colour-blindness which would be a source of real danger in navigation. But, apart from this combination, it seems to us clear that a defective colour sense *per se* is not a danger.

To one other set of facts we should like to draw attention before closing this communication. It is as to the difference which circumstances have forced us to make between visual acuteness and the form sense. Innumerable text-books use these terms as synonymous, but that is a convention to which we cannot agree. The form sense is a function of the entire field of vision. Visual acuteness is strictly limited to that part of the field of vision which corresponds with the macula lutea. If a suitable point of fixation be taken, and the vision directed steadily on this point, then the shape of objects at a considerable angular distance from the visual axis—that is, the line joining the point of fixation and the first nodal point of the eye—can be distinctly seen.

To give a concrete example. I look at a small point on a tablecloth with one eye, the other being excluded from the act of vision. I put several objects on the table, such as coins, a pocket knife, a pair of scissors, and I can at once see that they are there. I can perfectly distinguish their forms, and recognise their colours, size, &c., for the parts of the retina on which their images are made there is unquestionably form sense, but, as will be seen presently, there is no visual acuteness. The test objects can be placed at the extreme periphery of the field of vision, and still the forms will be quite distinguishable. That the visual acuteness is limited to a very small area round the point of fixation is easily proved. If a single word about the middle of a page of print be selected as the fixation point, the reader will observe that he can see that word perfectly clearly, and also, perhaps, a few letters of other words in the immediate neighbourhood

if the word selected be small, but he is entirely unable to distinguish anything else on the page. He has the form sense in the periphery of his retina, he has got visual acuteness only at the macula. This is a distinction of great importance, for many forms of employment, and, we believe, amongst the number most of the work connected with navigation, only require this form sense and not visual acuteness.

It is, of course, obvious that the reading of charts, and similar parts of the science of navigation requiring reading and writing, necessitate a certain visual acuteness; but the picking up of objects at sea and, generally speaking, the duties of an officer of the watch are dependent upon the form sense rather than on the visual acuteness. At the moment I know of a man engaged in river pilotage who has something like 6 dioptres of myopia, and whose visual acuteness does not exceed $\frac{6}{36}$ of Snellen, yet this man has been engaged for many years as a river pilot, and has never once been in any difficulty. His duties are performed for the most part by the form sense, and not by visual acuteness. If it were the latter, navigation would be to him impossible. This form sense is probably intimately associated with the light sense, and will, for example, enable a man on the bridge, even with a fairly high degree of myopia, to locate perfectly accurately the position of a buoy, or of a beacon, or of a landfall, although his visual acuteness is, for such long distances, absolutely defective. Quite recently I have seen a case of a man with 5 dioptres of myopia, and whose visual acuteness was not equal to $\frac{6}{36}$ of Snellen, and yet this gentleman had no difficulty whatever in seeing a buoy about 2 miles away. Here, of course, he recognised the object, not by his visual acuteness, but by his light sense. Indeed, as already stated, all the duties of an officer of the watch, so far as they are concerned with keeping a lookout, depend upon the form sense rather than upon the visual acuteness. The form sense, as distinguished from the visual acuteness, is by itself sufficient to give him accurate projection, which, of course, is a primary requisite; not only so, but for almost all forms of manual employment all that is required is the form sense, and in the work of a labourer, and in many other kinds of manual employment, visual acuteness does not come into play at all, it is the form sense and the sense of projection. Our chief reasons, and they may not be altogether very adequate ones, for associating the form sense with the light sense, are the facts connected with amblyopia *ex* anopsia and

operations for such degrees of congenital cataract as have prevented the visual acuteness developing.

Amblyopia accompanying concomitant squint is fairly easily explained. It simply depends upon the want of development of the visual functions in connection with the squinting eye. If a young child, say, about 1, 2, or even 3 years of age, begins to squint, and constantly squints with the same eye, then amblyopia will ensue, for the brain functions in connection with that eye which are associated with visual acuteness will never be developed. Further, if in after life, say in adolescence, the eye is put straight, visual acuteness will not be to any extent developed. When an adolescent is found who has this form of strabismus, and who yet has good visual acuteness in each eye, it will generally be ascertained that the squint in early life was alternating, or that it did not set in till the patient was 5 or more years of age. To the best of my powers of investigation that is how the matter stands. A person who has amblyopia associated with squint has in the deviating eye all those functions of vision which are associated with the light sense, and, consequently, has the form sense. He has not, and never can acquire, visual acuteness in the squinting eye.

Even more indisputable are the results of operation in those cases of congenital cataract where the opacity has been so severe as to prevent vision in the ordinary sense of the term. It has been our lot, at anyrate on two occasions, to treat such patients, and some others have been reported. In the two cases which came under our own observation operative interference at once, and thoroughly, removed the opaque lenses. The opacity had been so considerable as to prevent any development of the visual acuteness, but, notwithstanding, the patients had extremely good light projection and, so far as it could be tested in such circumstances, good fields of vision. The operations were entirely successful in removing the opacities, and on examination the fundi were found to be absolutely as in health, and yet no visual acuteness, in the proper sense of the term, had ever become developed.

One patient was a man of great mental power. He was a most distinguished student in the University of Edinburgh, and altogether had a remarkably brilliant career; but even after the lenses were removed, although his eyes looked perfectly healthy to the ophthalmoscope, the lad was never able to be taught to read or write. He took diabetes and died of it, and at the time of his death was "reading for

honours" in the department of mental philosophy in the University of Edinburgh. There was no lack of intellect, it was simply a case of the visual acuteness not having been developed. It is to be noted that this gentleman had exactly those powers of vision which are associated with the light sense, although, of course, even these were not well developed. He could make out objects, he could tell differences of illumination, he could even walk with comparative freedom along a road, he had the functions of vision depending upon the light sense, but absolutely no visual acuteness in the restricted and proper sense of the term.

The other patient was a young girl who earns her living by teaching music. The same thing occurred in her case. Laborious hours were spent both by myself and the house surgeon in trying to get her to read such print as Nos. 14 and 16 of Jaeger's types, but all to no purpose. No. 20 she could spell, but that, of course, was entirely a matter of the light sense and not of visual acuteness, yet this girl is able to make her livelihood by teaching the piano, and is able to get into a tramcar down at Dalmuir and come up to the city of Glasgow and find her way to the Glasgow Eye Infirmary without any assistance or trouble. Here, again, the functions of vision are those due to the light sense and not to visual acuteness.

It is specially to be noted that in both these patients there was good light sense before they were operated on. The opaqueness of the lenses had not interfered with the development of the light sense, but had interfered, and most markedly so, with the development of visual acuteness. We venture to say, and that without fear of contradiction, that no person has been operated on for congenital cataract after adolescence with restoration of vision in the sense of visual acuteness. So far as we are aware, in the cases recorded any vision that results in such patients is poor, and is merely such as is to be obtained from an ill-developed light sense.

The bearing of this on Molyneaux' problem is, of course, quite obvious. Molyneaux' question was, Supposing a person was kept totally blind from earliest infancy till manhood, if then the possibility of sight were suddenly restored, would that man see? The answer, of course, all depends upon what is meant by sight. If it means to see like an ordinary mortal—that is to say, to be able for reading and writing and the other occupations in life which require visual acuteness—then the answer is absolutely in the negative. The person never will; but under ordinary circumstances if the

opacity has allowed sensations of light, then the light sense will be developed, at anyrate to some extent. Probably, however, if the blinding was so intense that no ray of light whatsoever had ever penetrated in the early years of life, then even that amount of vision would not be vouchsafed. No case of that kind is on record. Reasoning by all analogy, that is likely to be the case. In the ordinary sense of the term, certainly in Molyneaux' meaning of it, no case of congenital cataract has as yet been made to see by operative interference, or, in the nature of things, ever will be.

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