Average visual acuteness / by Freeland Fergus.

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By Freeland Fergus, M.D.

Had circumstances admitted of my attending the annual meeting of the British Medical Association at Swansea, it was my intention to have called in question the term "Normal Visual Acuteness" as generally employed by ophthalmic surgeons and by writers of ophthalmic text-books. As I was unable to be there, I gladly avail myself of this opportunity of bringing before colleagues some considerations as to the results of vision testing, on which their views cannot but be of great importance, not merely to those who practise ophthalmic surgery, but to the community at large.

I am not here for the purpose of introducing any new set of types, nor, indeed, do I wish to discuss those already in use. It does not seem to be vital as to whether we use Snellen's or Monoyer's, or those of Parinaud, or those more recently devised by Landolt. Although I do not employ the latter, the scale which they afford seems to me to have some substantial advantages.

Any set will do if used with care, and if a surgeon always uses the same set with the same illumination he will get results which are strictly comparable. That the illumination should be a constant is perhaps a matter to which most of us pay but too little attention.

I believe I am not wrong in saying that the types generally used in this country are those of Professor Snellen; they are in every way suitable for the purpose of testing the form sense, as they form a definite scale, based on the one minute angle. That is all, however. No error can arise so long as it is recognised that they afford a useful scale, but are not in themselves absolute measurements. Let me illustrate my meaning by a simple analogy. In forming a scale of temperature Fahrenheit took as his starting point the lowest temperature which he could obtain. He found it to be thirty-two degrees below the freezing point of water. He therefore fixed the zero of temperature at thirty-two degrees below the melting point of ice.

Snellen experimented with healthy emmetropic eyes, and found that the smallest object which the average of such eyes could see must subtend an angle at the first nodal point of the eye of one minute, and that before two objects could be seen as distinct objects they must each subtend an angle of one minute and be separated from each other by an interval corresponding to one minute. His scale is based on these observations, and with it we do not intend to find any fault; it is excellent, and in every respect useful and reliable. When a person who is placed at six metres from the types is able to read the smallest of Snellen's types he is said to have normal visual acuteness. It is against this statement, because it is in many important circumstances misleading, that I desire to enter a mild protest. In the recent edition of Mr. Hartridge's valuable book (page 58), the author states that this is the average vision. We beg respectfully to call the statement in question.

The normal temperature of the human body is said to be 98·4° of Fahrenheit's scale because it is the average temperature of healthy persons. At a certain period of the day it is above this, at another time below it, but if a sufficiently large number of healthy persons be taken and their highest and lowest temperatures be noted, and the

average struck, then the mean will be found to be 98·4° of Fahrenheit's scale. The phrase "normal temperature" implies this, or it is without meaning. Even in this case a reservation would have to be made. It would require to be stated that it is only the average of temperatures taken in the axilla, but is not the normal temperature if the observations are made in the mouth or in the rectum.

Now it cannot be maintained for a moment that visual acuteness of $\frac{6}{6}$ is the average of mankind. It may or may not be the average of the healthy emmetropic eye. Snellen has satisfied himself that it is, and I do not for a moment dispute the observations of so accurate and honest an observer. All I object to is that it should be called normal visual acuteness, in so far as that phrase is calculated to convey to the mind of anyone who is not familiar with the subject the idea that it is the average of mankind.

To begin with, just as temperatures much below what Fahrenheit thought the lowest obtainable have been reached, so visual acutenesses much above what Snellen deemed the best have been recorded. Then, again, we have the large class of cases in which the eyes are hypermetropic or in which there is simple or compound hypermetropic astigmatism, and in which the visual acuteness is by no means $\frac{6}{6}$ of Snellen's scale. Further, it is generally said that in healthy eyes with emmetropia the visual acuteness diminishes with years. Again, we must remember that there are many sound eyes which are myopic, in none of which can the vision be $\frac{6}{6}$. Therefore, although it is true that there are a few eyes with better vision than $\frac{6}{6}$, it is undoubtedly the case that the average of the healthy eye is considerably below it. For these reasons the term normal visual acuteness should not be applied to the starting-point of Snellen's scale.

These facts are sufficiently familiar to all ophthalmic surgeons, and to them they do not require to be stated at this time of day. Were they the only persons involved

I would not have had the temerity to bring the matter before an audience such as I have now the honour to address. Others, however, are interested, and to them the phrase normal visual acuteness is apt to be misleading. Since the Workmen's Compensation Act was passed some years ago a very large number of cases of eye injury have come before the judges appointed to examine into such matters. These gentlemen are for the most part minor judges,—in Scotland sheriff substitutes—or else medical practitioners, no doubt of excellent standing, but who are generally quite unacquainted with the methods of taking the form sense.

Take the case of a man who has entirely lost one eye; we shall suppose that the other has escaped, and that there is no danger of sympathetic ophthalmitis or even of sympathetic irritation. It is admitted on both sides that the vision of the remaining eye is, say, one quarter of the so-called normal. The judge is apt to argue, and as a matter of fact often comes to the conclusion, that this is a case in which the workman has lost one eye, and that since the other one is undoubtedly so much below what he, from the phrase normal vision, believes to be the average, that the man is no longer fitted for his work. He does not realise that the same man, when endowed with both eyes, had probably not a higher visual acuteness than he now has with only one. Let him, however, understand that the words normal visual acuteness do not indicate the average of mankind, but refer only to an arbitary standard for a certain type of eye, the case will probably assume a different aspect to him.

What, then, should be done so as to prevent this misapprehension on the part of persons who, however painstaking and honest in their endeavours to form a correct opinion, are misled by language which in itself is inaccurate, although of perfectly definite meaning to those who use it?

The first suggestion which I have to make is that we give up calling $\frac{6}{6}$ Snellen normal visual acuteness, and

substitute some other term, such as typical vision or standard vision. That, to some extent, would meet the case, and I hope that this influential Society will give its *imprimatur* to some such alteration. But another suggestion seems to me to be, if somewhat impracticable, at least important. An attempt might be made to determine the lowest visual acuteness with which a man can follow any particular calling. An ophthalmic surgeon may at present be asked, "Do you think that with vision of only one quarter of the normal a man is capable of carrying on his work as a carpenter?" His answer at present must be a matter of his own individual opinion, perhaps backed by careful observation of actual cases. A surgeon may have data of his own to guide him, but so far as I know there has been no general effort made at collecting and tabulating results for the different trades and callings involved in the Workmen's Compensation Act.

Is it too much to hope that this Society, which is regarded as authoritative in ophthalmic matters for the United Kingdom, will appoint a committee to consider the whole matter, so that a large number of accurate observations may be available for the guidance of those who are anxious to have correct information on such points? Results obtained in this way would be of great economic value, and by collecting the necessary statistics this Society would add another to the many services which it has already rendered to ophthalmic science. In fact, a permanent committee on the relations of ophthalmology to the various trades and occupations of men might, from the standpoints of the political economist and of the statistician, be of great use to the community. The work to be done is so great that no one man is able to undertake it, and there should be a joint agreement as to the best method of obtaining data and of tabulating results. Take but one example.

There is a general consensus of opinion that a colour-blind person is incapable of undertaking the duties of

navigation. In view of certain facts with which I am acquainted I cannot admit that conclusion. It would be the duty of such a committee to ascertain under what circumstances and to what extent colour blindness is dangerous. My own belief is that it is only so when accompanied by a defective light sense.

Oddly enough no attempt is made so far as I know either in this or other countries to test the light sense of those who are to take charge of a vessel. Speaking as I do with some practical knowledge of navigational duties, having kept the watch in all sorts of weathers both by day and by night, I think it highly probable that if sufficient data were obtained it would be found that a defective light sense is more dangerous than a defective colour sense.

As further illustrative of the foregoing remarks I may mention a case recently tried in one of the law courts under the Act in question. The man had been a collier, and had lost one eye from injury. The other had a slight myopia and had a visual acuteness of $\frac{1}{3}$ Snellen. Two gentlemen were of opinion that he was unable to continue his work with only that amount of vision. As I happen at present to be taking notes of cases, which seem to be important, I was able to quote a case in which, from excessive myopia, one eye was practically blind. The other eye had a myopia of about 6 or 7 D., and a visual acuteness by Snellen's scale of about $\frac{1}{10}$; yet that man had maintained himself as a collier. He never suspected that anything was wrong till he tried to get into the service of a railway company.

Still more interesting is the case of J. A—, æt. 29 years, who had been regularly employed as a collier. In one eye there was a myopia of 10 D., in the other of 14 D., but in neither was the vision equal to $\frac{1}{10}$ of Snellen. It must have been considerably under it.

If I am not intruding too long on the time of the Society I should like to mention two other cases which are of importance as showing that two eyes are not

necessary in judging of alignment merely. At Messrs. Caird's yard in Greenock I saw an old man busy caulking. One eye had been enucleated. In consequence of corneal ulceration there was a nebula on the corner of the other eye in part opposite to the pupil. For years he had been in this condition, but was still able to earn his living as a caulker.

The second case which I wish to mention was that of a gentleman who was a keen bowler, and who unfortunately lost the sight of one eye. It made little, if any, difference to his play. He won the President's prize of the green on which he played the year previous to his loss, and he also did so the year following. His only difficulty was in seeing if a bowl in the vicinity of the jack was what is, I believe, technically called jack high.

A collective investigation of a large number of such cases cannot fail to be of great public utility.

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