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Contributors

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With the water colour

EYESIGHT OF SAVAGE AND
CIVILISED PEOPLE. 16.

BY

CHARLES ROBERTS, ESQ., F.R.C.S.



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EYESIGHT of SAVAGE *and* CIVILISED PEOPLE.

By CHARLES ROBERTS, Esq., F.R.C.S.

THE proposal to test the relative eyesight of savage and civilised races is by no means a new one to English anthropologists. In the small volume of "Notes and Queries on Anthropology" drawn up by a Committee of the British Association, consisting of such well-known members of this Institute as C. Darwin, E. B. Tylor, Col. Lane Fox (Pitt Rivers), Dr. Beddoe, our President, and many others, tests and instructions are given for this purpose. These tests are the set of dots employed by our army surgeons for testing the (minimum) eyesight of recruits, and consist of a series of dots $\frac{1}{8}$ inch square, grouped in a variety of ways to prevent guessing or imposition on the part of the person under examination. These army test dots were largely used by the Anthropometric Committee of the British Association which closed its operations in 1883, but as the results in some instances were not satisfactory they were given up in favour of Snellen's test types. The objections to the use of the army test dots were (a) that some of the dots being placed at unequal distances from each other they were distinguishable at varying distances; and (b) the great distance at which the dots are visible to persons with good eyesight (theoretically 57 feet) in a great measure prevented their use in towns where sufficiently long and well-lighted ranges were difficult to find. Since the Anthropometric Committee issued its final Report I have analysed the returns of eyesight sent in, and after eliminating the observations which

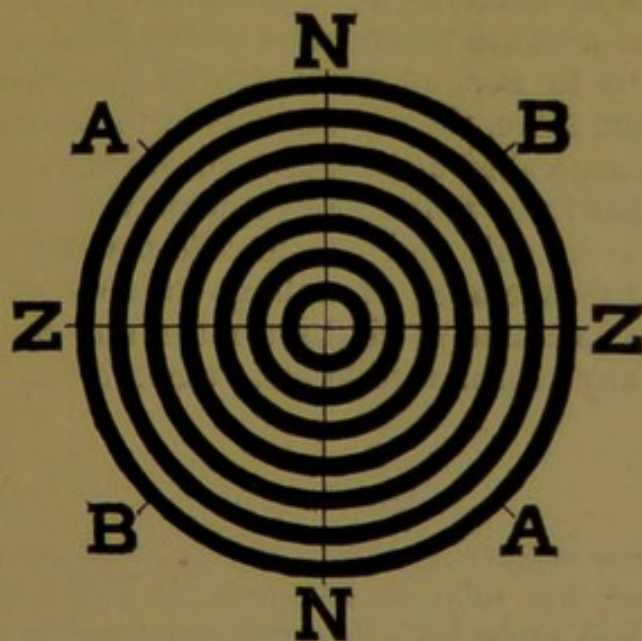
were known to have been taken under unfavourable conditions of illumination, the results appear to me to be quite trustworthy, as they conform when grouped in the usual manner to the well-known "law of error." The groups increase in a fairly uniform manner from four observations at and under 5 feet, up to 272 observations at 50-60 feet, and then diminish in a similar manner to four observations at 110 feet and upwards ; the mean or largest group being, at 57.5 feet, identical with the theoretical distance at which the dots are visible to persons with good eyesight. The difference, moreover, between the eyesight of town folk and of country folk, as shown by these statistics, is barely 4 per cent. in favour of the latter, a difference which is probably to be accounted for by the better light in the country. These results would seem to show that the varying distances between the dots on the test card is not a vital objection to their use, as the result depends on the power of the eyes to separate the dots which are nearest together, and these are always separated by one diameter. It would be desirable, however, in altering these tests, or in devising new ones, to avoid this possible source of error and arrange the test objects, whatever form they may take, at equal distances from each other. [A diagram was here exhibited showing the effect of grouping the test dots at distances of one, two, three, four, and five diameters apart, and the increasing distances at which each set is visible.]¹

In arranging tests for eyesight sufficient attention has not been given to the interference with their use which astigmatism produces. This defect of sight is much more common than is generally supposed, being according to my experience rarely absent in adult persons, but has not received so much attention as other defects of sight because it does not in some of its forms materially interfere with the ordinary use of the eyes. In these cases there is a meridian of the eye which possesses the proper focal length lying between two portions which are imperfect. In the ordinary use of the eyes the meridian of good sight is made, by the rapid movements of the eyeball, to range over the object to which attention is directed and a sufficiently clear image of it is formed on the retina, but it is quite otherwise when the attention is fixed on a small object like a test dot or a test-type. In this case the test object becomes elongated in a direction at right angles to the meridian of good vision, and hence dots

¹ It must be borne in mind that these test dots are used in the British army as a *minimum* test, and any recruit who cannot distinguish them at a distance of 15 feet is rejected as unfit for military duties, as he would be unable to see a bull's-eye target 2 feet square at a distance of 600 yards. The instructions for carrying out this examination of recruits are unfortunately introduced in the "Notes and Queries," and they must be very puzzling to persons not accustomed to testing eyesight.

separated by only one diameter are seen together and assume the appearance of a continuous line before they disappear from sight by increasing distance. This common form of astigmatism is attributed to irregularities of the surface of the cornea, but there are other forms due to irregularities in the form of the lens which have received little attention from ophthalmologists, and which are often confounded with myopia, with which they have many features in common.

To eliminate the interference of corneal astigmatism with the use of small test objects, and as the direction of the meridian of good sight is not constant but varies in different persons, and possibly in different races, I have proposed the adoption of a series of concentric circles, which, as they embrace the whole field of vision, must be visible to astigmatic eyes in one direction, and in this direction therefore the lines may be counted. (See figure.) These circular diagrams are a most delicate test for all forms of astigmatism, apart from other forms of defective eyesight.



There are many reasons why we should hesitate to accept the statements often made relative to superiority of the eyesight of savages over civilised peoples till the sight of both has been submitted to some rigid test similar to those I have referred to. I have myself been much among savages (several tribes of North American Indians, Australians, and the Hill tribes of India) without noticing any remarkable manifestations of good eyesight apart from that which was due to a special knowledge of the objects observed. The travellers' tales on this subject are to be accounted for by faulty standards of comparison. Many—probably most—travellers are ignorant of the quality of their own eyesight, and

sailors, from whom many of the stories reach us, are a wonderful class, and not always the masters of their imaginations. The cases, moreover, which have been recorded are only those of persons who possess remarkable eyesight, and not the average of a large number of the same race living under similar conditions of life, and we do not know the best eyesight among civilised people with which to compare these cases. Eyesight equal to a visual angle of one minute has been accepted as the average of civilised persons, but this necessarily represents only half the acuteness of vision which some persons possess. Inspector-General Lawson, recording his own experiments in the Report of the Anthropometric Committee for 1881, tells us that he could at one time distinguish a flagstaff at Aldershot, the smaller diameter of which was 6 inches, at a distance of three miles, under favourable conditions of the atmosphere, the visual angle subtended being only 6·7 seconds, or a ninth part of the commonly received visual angle of one minute; and he further states that it could be seen by other persons under similar conditions. Among the observations collected by means of the army test dots already referred to, four men are returned as seeing them at 110 feet and upwards, that is to say, at about double the average distance. It is obvious, therefore, that if the test is to be one of who can see objects at the greatest distance, we must begin by ascertaining the best eyesight to be found among ourselves. This would be, however, a very difficult and unscientific method, and it is only by obtaining the averages of a large number of observations among savages and among civilised races, and comparing them together, that any useful results can be obtained.

DISCUSSION.

The PRESIDENT remarked, before the first paper was read, that the question of the relative keenness of sight of savage and civilised races had lately been brought prominently into notice by Mr. Brudenell Carter. It concerned a matter of fact, and was one which this Institute might legitimately undertake to get solved. The question was not as to the greater quickness of observation and of perception of the savage, because on that point all were agreed; but whether his eye, as an optical instrument, was superior to that of a civilised man. To solve this question, satisfactory tests had to be thought out equally suitable for use in savage and civilised countries, and if this could be done there was little doubt that this Institute was capable of inducing many travellers to apply them.

After the reading of the papers, the PRESIDENT expressed his satisfaction at finding that there was a concurrence of opinion on one essential point, namely, on the superior merits (under clearly explained conditions) of test dots or circles. He himself thought

that for the purpose of travellers the number of those dots should be limited to one or two. He exhibited a thin octagon zinc plate, 5 inches in width, with holes in it to which paper test circles, of whatever construction might be adopted, could be attached by threads. The plate would be propped on one or other of its eight sides, giving that number of varying test positions.

[*Reprinted from the Journal of the Anthropological Institute, August, 1885.*]

