SOME IMPORTANT OCULAR CONDITIONS FOUND IN BACKWARD CHILDREN WITH REPORT OF CASES

BY

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In an extremely interesting and pertinent magazine article, Mr. Earl Mayo, who is a recognized authority upon questions of public health, has graphically shown that the greatest asset of any nation is its human lives. He calls attention to our agricultural products, railways and manufacturers, representing a monetary value of billions of dollars and shows that the monetary value of a human life to the community based on the conservative estimate of Professor Irving Fisher of Yale, would give a total valuation for our 90,000,000 lives far in excess of all other values combined.

The human crop then is the most valuable one which we raise and in the public schools we have opportunities for improving this valuable yield of which we have as a people, but recently begun to take advantage. With the general adoption of an adequate system of medical inspection in the schools of our country we may confidently expect, in succeeding generations, a sturdier, healthier race, whose physical and mental superiority will appreciably increase the national assets, for, in the last analysis it is the quality of human activity which really determines values.

What we put into medical inspection then for the improvement of the race is not spent, but merely invested to be returned later with interest by the increased efficiency of those who have benefitted by it. But as every child whose future efficiency we increase adds to the public wealth of the community, so every influence which hinders or prevents the normal physical and mental development of any child makes the community so much the poorer.

Millions of dollars are being spent annually in this country to care for and educate the children, but while we have a splendid system which we are constantly improving, there are certain conditions which are lessening its efficiency and increasing the expense of operation.

Dr. William H. Maxwell, Superintendent of Schools of the City of New York, in his report for 1904, called attention to the fact that a large number of pupils were shown by his tables to be above the normal age for the grades they were in. Further inquiry disclosed the fact that this condition was not confined to New York City, and it was

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deemed of sufficient importance to warrant an exhaustive study by Dr. Leonard P. Ayres for the Russell Sage Foundation, the results having been finally published under the title of "Laggards in Our Schools." Dr. Ayres finds, as we should expect, "that physical defectiveness has a distinct and important bearing on the progress of children," but he also shows that the child, who is normal but slow, has no chance of keeping up under our present system, is "thoroughly trained in failure" and is destined to live a life of failure. "We know them in school," he says, "as the children who are always a little behind physically, a little behind intellectually and a little behind in the power to do. Such a child is the one who is always 'It' in the competitive games of childhood."

During the past year the writer undertook an investigation of the causes of retardation of pupils under his supervision. Pupils who were unable to keep their places in the work of the schools without special attention, if at all, were adjudged "retarded" or backward for the purposes of the inquiry and were divided into groups as follows: (1) those who were mentally defective; (2) those who were normal mentally but had some physical disability like defective sight or hearing and (3) those whose mental processes were merely slow.

Those of the first group are naturally the most objectionable as they are not amenable to school discipline and often have vicious habits, thus exercising a decidedly unfortunate influence upon other and younger pupils in the lower grades where they often remain until 14 years old or more.

The second group may be still further subdivided into (a) those having remediable defects and (b) those having irremediable defects. Many of the former, as far as any prospect of improvement during their school life is concerned, most unfortunately be considered in the latter or irremediable class owing to the indifference of parents of their inability to provide suitable treatment for them. In the larger cities many of these unfortunate children get relief at the public dispensaries but in smaller communities they must at present depend upon the uncertain hope of private philanthropy, too often represented by the teacher whose sympathy leads her to contribute to this end from her hard earned salary.

In the third group are those who with special attention would do well, but who otherwise fall behind, lose interest and become mischievous and troublesome, interfering with the discipline of the school and adding to the burdens of the already over-taxed teacher.

Without going into detail, it is enough to say that investigation showed that 66% of the pupils of the second group had ocular defects. This paper aims to call attention to some of the ocular defects which are such a prolific source of retardation and cite a few illustrative cases.
It might, perhaps, seem a hopeless task to try to do anything for the mentally deficient pupils of the first group, but as a matter of fact they may frequently be greatly benefitted by the correction of existing ocular defects and should be carefully examined for them.

J. B., 7 years of age, had spent a year in school without making any progress whatever. The characters which he drew upon the paper given him for work, were utterly unintelligible. Examination showed that he was myopic, O. D. V7/50, O. S. V3/50. Correction was given him and he immediately began to improve, so that within a year he was writing complete sentences in a perfectly legible hand and taking great pride in what he could do. He has also learned to read a little though his enunciation is indistinct, but before the correction of his myopia his teachers had never been able to get him to speak.

Some children are unfortunate enough to be handicapped by physical defects which make them appear mentally deficient when they are not really so, but if these defects are not discovered and special instruction given them, they become really deficient through lack of training. There is nothing in the work more gratifying to the school physician than to discover one of these minds trying to grope its uncertain way through clouded senses and to watch its development as it is brought into intelligent relation with the outside world by means of special methods of instruction, which take into consideration the child’s limitations.

Such a case was that of G. L. who, when he was found by the writer in the first grade, three years ago, had been practically abandoned as unable to learn by his long-suffering teacher, who had a large school to care for. She believed that he was mentally incompetent, and there was reason for such a belief. As there were no tasks which he could do, the child spent the long school hours practically unemployed, twisting and turning about in his seat and making strange grimaces.

An examination gave O. D. V1/200, O. S. V20/100, due to irregular astigmatism and corneal opacities. The twisting and turning were now explained. Sitting through the school session without any intelligent idea of what was going on about him, the child was simply amusing himself getting glimpses of the light which streamed into the room from the various windows.

The school physician became convinced that the child’s mind was unusually keen and active. The teacher was informed of the result of the examination, and at once became interested, agreeing to do all in her power to make up for the poor eyesight of her pupil by special attention to his needs, a promise which she generously fulfilled. The parents were informed of the serious defect of vision and encouraged to aid the teacher by every means in their power. Inspired with a new hope, they took up the work with enthusiasm, and though of limited
means, even secured a tutor for a time. The results have amply justified the special care and attention devoted to the child. He now has excellent standing in his grade, the third, sings unusually well, has a wonderful memory and shows a remarkable aptitude for mathematics. The following are examples of his language, spelling and number work:

"G. L.
Oak St. School          Grade III
The Fox and the Crow.

A crow had a piece of cheese. One day a Fox saw The Crow fly in a tree and the fox said to the crow sing" but The crow wouldn't sing. And The fox said to the crow sing." So the crow sang. As The crow sang she dropped the cheese and The Fox ran away with it."

"G. L.                              Dec. 22, 1911.
Oak St. School          Grade III
Christmas                     Santa Claus
santa claus                  merry
Merry                         candles
Candles                       skates
Skates                        secret
secret                        birthday
Birthday                      candles
Christmas                     Christmas
Santa Claus                   Santa Claus"

"G. L.                              Dec. 21, 1911.
Oak St. School          Grade III
804   434   467   790
942   245   578   804
23    356   689   942

1769  1035  1734  2536
802   943   824   842
-497  -589  -298  -298

395   354   526   544

802   943   824   842
923   834   945   853
x 4   x 5   x 6   x 4

3692  4170  5670  3412
233   034   493   023

4) 932  3) 102  2) 986  5) 115
233   34    493   23
x 4   x 3   x 2   x 5

932   102   986   115
So much for his work in school, but one must see him at play in the sunny school yard, his face beaming with happiness and his body swaying in perfect rhythm while he sings in a sweet, clear voice with the other children at their games, in which he is unable to take a part, to understand what it has meant to him to have a chance.

This boy was saved from the neglect which threatened him as mentally incompetent and placed in the second group where with special attention he promises to become a useful member of society.

O. L., a first grade pupil, was reported to the school physician as a backward child, doing few of the simple tasks given her, and none of them well. An examination showed that she was hyperopic. Little help could be secured from the child in making the test, but the hyperopia was estimated objectively to be five dioptres in the right and one in the left eye. O. D. + 3.00 Ds and O. S. + 0.75 Ds seemed to be most acceptable and was given, when a remarkable change took place in the character of her work, shown in Figs. 1 and 2.

These are both exact reproductions of the original tracings made by the pupil over letters drawn by the teacher—Fig. 1 before correcting lenses were applied and Fig. 2 afterwards. The groping irregularity of the lines on Fig. 1 suggests the nervous energy wasted by the child in trying to drive the unwilling pencil over its blurred and uncertain course, while the easy swing of the lines in Fig. 2 indicates something of the relief she must have experienced in the removal of the accommodation strain, comparatively little though it was.
Thus pupils of the second group who have remediable defects may become physically and mentally normal.

There is one remediable defect which every school physician and nurse should thoroughly understand in order that they may impress the importance of its early correction upon parents, and that is internal strabismus. The idea is too common among the laity that children will outgrow this condition whereas as a matter of fact it will simply become confirmed. These children are hyperopic, generally highly so, and as accommodation and convergence are associated, the excessive effort which they must make in overcoming their hyperopia results in a loss of binocular vision. The eye with the higher degree of refractive error, if a difference exists, is pulled in by the strong impulse of the internal rectus muscle and the image of that eye is eventually suppressed.

The remedy is, of course, the early correction of the hyperopia by properly adjusted convex lenses. Unfortunately the test of vision made by the teachers in our Massachusetts schools does not show any but the worst cases of hyperopia, and the school physician cannot usually devote sufficient time to each pupil to discover it even if he were familiar with the usual means of testing for it, such as the ophthalmoscope, retinoscope or trial case. There is, however, a very simple procedure which will disclose any considerable degree through the associated muscular imbalance. This consists in having the pupil fix an object
twenty feet or more away, the examiner alternately covering first one eye and then the other with a bit of cardboard. If there is any considerable degree of hyperopia it will be found that the covered eye has failed to hold in line and turned in toward the nose. This is not of course apparent until the eye is uncovered when it is seen to jump back into line and again fix the distant object. The early application of this simple test will disclose many cases of eye-strain which if left uncorrected would eventually become strabismus. In these uncorrected cases the eye will at first turn in toward the nose only occasionally. If the strain is removed by glasses early, the "squint" is frequently entirely removed and binocular vision restored, while the child experiences great relief be having the accompanying eye-strain removed, but if neglected, a time will come at length when the deviation of the eye becomes confirmed and can only be corrected by surgical measures which frequently have to be repeated before a satisfactory result is obtained and even then glasses must be worn to relieve the strain.

It is not always possible to straighten an eye in this way but the chances are always better the earlier the remedy is applied and the proper glasses may afford great relief to the child by removing the eyestrain, even if they do not wholly succeed in straightening the eye.

Figure 3 shows a boy of five years found in the first grade with a very marked deviation inward of the left eye. Notice was sent to the parents that the child was suffering from eyestrain, and they promptly took measures to have it relieved. Figure 4 shows the same boy wearing a convex lens of three dioptres focal strength over the right eye, and one of four dioptres over the left eye, thus removing the eyestrain and enabling the eyes to work together with precision, to the great relief of the child who had been doing his school work under an immense handicap.

These facts with regard to "squint" are not new but they need to be brought to the attention of the school physician and the school nurse.
The last ocular defect to which I wish to call attention is a form of amblyopia which I have failed to find described in the literature to which I have had access. The cases which I have seen have been in young girls and were characterized by more or less irregular peripheral contraction of the visual field and imperfect vision which is not due to any refractive error or visible ocular defect or disease.

The following is a typical case:

M., a bright, vigorous, well nourished girl of seven, with none of the stigmata of hysteria was first tested in April, 1908; vision, O. D. = 20/100, O. S. = 20/100. The keratometer indicated no astigmatism and retinoscopy gave normal refraction. The ophthalmoscope showed normal fundi and agreed with the retinoscope as to the absence of refractive error. I could only explain the case at the time as one of malingering, but did not feel satisfied. Nearly four years later, in January, 1912, I had an opportunity to examine the child again and found O. D. V20/200, O. S. V20/100-1, practically the same as at the first test. The field of vision tried roughly with a piece of cotton on the end of a pencil suggested peripheral contraction. Two more tests were made at intervals with slightly varying results and in March, 1912, a one per cent. solution of sulphate of atropine was instilled for two days and a test made with the following result:

O. D. V12/200 + 1.00 Ds. = V20/70 + 1
O. S. V12/200 + 1.00 Ds. = V20/50-2.

A trial pair of glasses was given with + 0.50 Ds. O. t. for near use.

April, 1913, one year later, another examination gave:

O. D. V20/70-1 + 0.50 Dc axis 180 = V20/70-1 (clearer).
O. S. V20/50-2 + 0.50 Dc axis 180 = V20/50-1

and these lenses were prescribed.
A careful test of the visual fields for white showed a contraction of both, Fig. 5, but more marked on the right where the defect was both nasal and temporal. On the left side the defect was chiefly temporal.

The vision in this case as in others which I have seen, shows a tendency to improve.

I believe that these are cases of imperfect development of the visual function and that the defect is central, but they need to be studied very carefully and I hope that we shall hear more about them in the future. The new-born infant with perfect visual organs is practically blind, the maximum visual acuity not being acquired much before the seventh year. Beyond that period it is possible to acquire exceptional visual powers by constant practice. To Professor Percival Lowell, whose unusual development of visual acuity enabled him to enrich the science of astronomy through his minute studies of the Martian canals, most men seemed "telescopically blind." In these children then, the development of the visual function seems to have been arrested from some as yet obscure cause, and it is important that the condition should be recognized early in order that they may not only receive whatever aid the oculist may be able to give them, but that they may also be treated with such consideration by their teachers as their limitations would suggest.

After all has been done which can be done in the way of removing physical defects, backward pupils should be placed under a special teacher whose business it should be to study the individual needs of each child and supply the particular kind of training which will be most helpful in bringing him or her up to the normal standard. To accomplish the best results such a teacher should have had experience in this
special sort of work, besides being a person of intelligence and tact. With the retarded pupils under such leadership the schools are relieved of those who not only do not keep the pace themselves but actually hinder the progress of others, while they receive a training which brings many of them up to the normal standard and saves more from a discouragement which would probably follow them through life.

Summary.

1. Backward children are expensive to the community both in school and in after life.

2. The correction of the physical defects by which many backward children are handicapped and special individual training, are the efficient means by which these children may be saved from incompetency.

3. Investigation of backward children indicates that ocular defects are most important as a cause of "retardation."

4. The correction of refractive errors in the mentally deficient child is beneficial.

5. It is important to correct hypermetropia early, thus stopping a needless waste of nervous energy and in certain cases preventing or correcting squint.

6. There is a form of amblyopia among children which is little understood.