

ON THE  
BEST MODE OF TESTING  
THE  
HEARING OF SCHOOL CHILDREN,  
AND OF  
PROVIDING FOR THE INSTRUCTION OF PARTIALLY  
DEAF CHILDREN.

BY  
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INSTRUCTOR IN OTOTOLOGY IN HARVARD UNIVERSITY.

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EXTRACTED FROM THE TRANSACTIONS OF THE  
INTERNATIONAL MEDICAL CONGRESS,  
PHILADELPHIA, SEPTEMBER, 1876.

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PHILADELPHIA:  
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*With the Author's Compliments*

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## ON THE BEST MODE OF TESTING THE HEARING OF SCHOOL CHILDREN, AND OF PROVIDING FOR THE INSTRUCTION OF PARTIALLY DEAF CHILDREN.

ONE of the strongest arguments in evidence of the importance of the subject expressed in the title of this paper, is the fact that, except in individual cases, or where the loss of hearing is so great as to result in deaf-mutism, no provision is made in our present school system for the special instruction of those children whose infirmity, in this respect, gives them, if anything, a larger claim upon the efforts of those to whom is entrusted the laying of the foundation of that mental development which is the basis of the prosperity of a people. To the attainment of that proper degree of mental development which raises the man above the animal, the sound mind in the sound body is necessary; and when one of the channels for communication from without, is either wholly or partially closed, there devolves upon those who have the furtherance of this development in charge, the duty of compensating in one way or another for the loss. How this may be best accomplished in the case in question, is for us to consider.

In a work on the physical and mental education of deaf children, published with the sanction and under the advice of Prof. Von Tröltzsch, the author says:<sup>1</sup> The generally received opinion that diminution of hearing in children, in consequence of disease of the ear, is rare, is a mistaken one; indeed, in some localities, the cases of disease of the ear exceed in number the cases of disease of the eye, and moreover they are apparently on the increase; the steadily increasing demands upon the mental capacity, accompanying the advances of the times, bring the defects of hearing more and more prominently forward, because they show themselves to be a decided hindrance to the better education of the child. The results, on its later mental development, of the loss or diminution of hearing in a child, are decided and permanent—affecting the understanding, the character, the self-confidence, and, at a later period, the ability of self-support: mental tools the possession of which is invaluable, and the want of which can never adequately be supplied. In this view, it is a matter of concern that more attention has not been directed to the educational development of partially deaf children.

An examination of a number of cases of partial deafness, occurring in children under sixteen years of age, shows that, with the exception of a majority of those cases in which the disease of the ear has been of a character, or of a degree of intensity, sufficient to so far impair the hearing as to be followed by deaf-mutism, the diseases of the ear in

<sup>1</sup> Franciska Schaeling. Beiträge zu einer richtigen, leiblichen, und geistigen Erziehung gehörkranker Kinder. Thorn, 1872.



children are amenable to treatment, with more or less improvement in hearing, and that the impairment of hearing varies considerably in different cases, and is moreover subject, in any one case, to variation during the progress of the disease. In considering the subject of partial deafness, therefore, we have to deal at the outset with a factor in our problem representing an unknown quantity; each individual case of partial deafness must be, as it were, a law to itself, as far as the compensatory advantages to be accorded to it are concerned. To facilitate investigation, however, two general divisions of the subject may be allowed. The first will include those cases of partial deafness in which the loss of hearing is so great as to interfere with the acquirement of articulation, though not sufficient to permit the classification of the case under the head of deaf-mutism. This division will include those cases in which the diminution of hearing is so decided as to interfere with the independent acquirement of information through the medium of the hearing, and will imply the necessity for special instruction. The second division will include a much wider range of cases, from those in which the hearing is so slightly impaired as to permit of ordinary intercourse, downward through varying degrees of impairment of hearing until the degree belonging to the first division is reached.

Those whose cases come under the first division, form fortunately but a small percentage of all the subjects of partial deafness among children; and a consideration of their needs may be deferred, as secondary to the vision has been very generally made for their instruction. For the instruction of those whose cases come under the second division, there is, as far as I am aware, no provision made in our public schools, beyond the individual and independent efforts of the teachers. The children who are some special attention to the subject, with the view of determining the best means for giving them equal educational advantages with their more fortunate companions. To do this will require an examination into the nature of the cause of their disability, and the establishment of rules according to which the degree of impairment of hearing may be determined, that the character of the instruction may be varied accordingly.

An examination into the etiology of partial deafness, shows that the diseases of the middle ear are its most frequent cause in children, and the subacute or chronic catarrhal inflammation of the middle ear, or to the purulent inflammation accompanied by perforation of the membrana of the sequelæ of the exanthematous diseases of childhood. This general rule is subject to certain differences, in differing classes of society; among the wealthier classes, for instance, who perhaps merit our attention less in this connection, because their children are educated more frequently in private than in public schools, the diseases of the ear accompanied by partial deafness and more or less amenable to treatment, whole number of cases of ear disease in children and adults taken together. Of this number, making the 7.8 per cent. of the whole, 76 per cent. are traceable to the exanthematous diseases of childhood, especially scarlet fever, and in 56 per cent. there is found an existing purulent inflammation of the middle ear, requiring treatment, and causing a suf-

ficient degree of deafness to interfere with the patient's participation in the ordinary school exercises, on equal terms with other children.

Among the middle and poorer classes, the proportion of diseases of the ear in children is largely increased, and it is these classes which we have particularly to consider, since they more generally avail themselves of the advantages offered by public instruction. Out of 8715 cases of disease of the ear, examined in patients of this category,<sup>1</sup> 2175, or 24.95 per cent., occurred in children under fourteen years of age. Of this number, 2175 cases of disease of the ear accompanied by partial deafness, 1085, or 49.8 per cent., are recorded as examples of purulent inflammation of the middle ear; 113, or 10.5 per cent. of the cases of purulent inflammation, being due to scarlet fever. As many as 514 cases, or 23.6 per cent. of the cases of disease of the ear in children, are recorded as examples of either acute or chronic catarrhal inflammation of the middle ear. This brief analysis is sufficient to show the much greater prevalence of such diseases of the ear as are liable to induce partial deafness, in the children belonging to those classes in society which depend for their instruction on the advantages offered by our public schools. A more minute analysis of the material offered, which would hardly be in place here, affords interesting information as to the general causes and the average course and results of diseases of the ear in children. It may be remarked, however, that, in the analysis given, only those cases are included in which the deafness was not so decided as to interfere with the acquirement of articulation, or even with the use of the ear as a medium for instruction. The number of cases of positive deaf-mutism, and of cases in which, while there was a certain degree of hearing, it was so slight as to render instruction in articulation necessary, was 107, or, of all the cases in children examined, 4.9 per cent. The average age of all the children examined was about nine years.

We see, therefore, that in a large majority of the cases of disease of the ear occurring in children at an age when they should be profiting by school instruction, the disease is accompanied by partial deafness, and is moreover of a character to lead us to expect considerable variation in the hearing during the progress of the disease, or during the ordinary term of school life. This point is one which should be especially considered in coming to a conclusion as to the character of the instruction to be provided in these cases; we have to deal not only with a different factor, in the different degrees in which the hearing is diminished by disease in different cases, but also with a possibly variable factor in any individual case.

Admitting the necessity for making some provision for the wants of children of this class in our public schools, and excluding, for the present, those cases in which the deafness is of so high a grade that special instruction is absolutely necessary, we have to consider the advisability of establishing separate classes in our schools for the instruction of (1) of establishing separate classes in our schools for the instruction of partially deaf children; or (2) of instituting such a system of inspection as shall lead to a determination of the wants of individual cases, and as shall lead to a consideration thereof, on the part of the teacher, in addition to the ordinary course of instruction, as will permit of education in mixed classes, compensatory advantages being accorded in cases of partial deafness.

<sup>1</sup> Aural Clinic, Massachusetts Charitable Eye and Ear Infirmary; Statistical Report, Service of C. J. Blake.



The objections to the former course would seem to be—

(1) The encumbering of our school system with an additional department for which especial provision would have to be made. Against this objection it may be urged that initiatory steps have already been taken toward the establishment of separate public schools for the education of deaf-mutes, and the so-called semi-mutes, and that children suffering from partial deafness could be transferred to such schools, thus making use of a department already in process of establishment, and avoiding the creation of another additional department for instruction of only partially deaf children. While the instruction of semi-mutes in the same school with deaf-mutes proper, has certain advantages which have been successfully illustrated in the public schools established for that purpose in Boston, and of which I shall speak hereafter, there are certain arguments against this disposal of the question, and in favor of a different provision for the needs of those partially deaf children who do not at present, and, from what we know of the nature of the diseases which caused their deafness, are but little likely to, in the future, deserve classification among semi-mutes. These arguments are included in the further objections to the establishment of separate classes for instruction, which are—

(2) The moral effect upon partially deaf children of making them, and recognizing them as, a class by themselves, and the exaggerated sense of their infirmity resulting from their being so set apart. The object of the public-school education is to fit the children for the best use of their mental powers in adult life, and to enable them to associate in the world under circumstances which shall make their acquired knowledge best available for their own and the general good; and this object would be in a measure defeated by the encouragement, in partially deaf children, of those feelings with regard to their infirmity which are one of the chief misfortunes of the deaf-mute. To set them apart in the manner referred to, would be to permit an underestimate of their own powers, which, though every effort to counteract it should be made, would necessarily carry its impress into adult life.

(3) The loss of the beneficial association with hearing children, and of a proper spirit of emulation; for since these children are to go out into the world, where they will be judged by the general standard of effort and success, it is best that they should associate in the beginning with those who are to be their companions or their opponents in the struggle for existence, and that they should be urged rather themselves to compensate for their defect than to expect compensation at the hands of others. More precisely, the association with hearing children helps toward the overcoming of certain faults which are common in children who are partially deaf. Partially deaf children are very apt to become heedless and inattentive; from not hearing occasionally, they get into the habit of not expecting to hear, and make less mental effort to combine such sounds of the voice, for instance, as they do hear, or to supply the deficiency of those which escape them. The ultimate effect of this habit, if uncorrected, on the mental development, is very decided; for, in these cases of partial deafness, nature does not seem to have made that effort at compensation which is so strikingly illustrated in the quickened perceptive powers of the deaf-mute. Again, many partially deaf children are almost morbidly sensitive on the subject of their infirmity, and of their implied inferiority: a feeling which, if permitted or encouraged, has a very unfortunate effect upon the child's efforts in its studies,

and subsequently upon its efforts at the self-instruction and self-control of adult life. The association with hearing children, and that degree of participation in class exercises which is possible under certain favoring conditions, tend to overcome the self-consciousness which is always more or less of a barrier in the way of advancement.

(4) The final argument against consigning partially deaf children to a special class or school, lies in the fact, already mentioned, that the imperfection of hearing is not a fixed factor in the problem. In the majority of the cases included in the analysis given, the hearing was susceptible of improvement, and in all of them was subject to temporary variations during the progress of the disease or course of treatment.

The best fulfilment of the second course under consideration, education in mixed classes, necessarily entails a determination of the degree of physical disability of the pupil, for which compensation is to be made. This may be accomplished in two ways, of which the best is by means of a competent professional examination of each case of supposed or evident deafness occurring in the pupils of, or those presented for admission to, a public school. This course offers the advantage of determining with accuracy, not only the degree of hearing, but also the character of the disease which causes the deafness, the amenability of the case to treatment, the probable course and duration of the disease, and its probable, ultimate effect upon the hearing; in very many cases, as may be judged from the statistics given, the need of treatment would be detected where otherwise it might have passed unnoticed. The establishment of the office of medical supervisor of public schools, the position to be filled by a qualified medical man who should devote his time to the duties of his office, would cover this in addition to many more important needs in connection with the hygiene of our public schools.

In default of this more thorough method of examination, the object, as far as a determination of the degree of hearing is concerned, may be accomplished by the teacher, to whom may be committed the task of classification according to certain simple rules for testing the hearing, applicable to all cases. The ordinary tests for the hearing, by means of the watch and tuning-fork, or the use of other musical tones, are each of precise value only when taken in connection with a competent examination into the condition of the diseased organ, and a careful consideration of points of which only a professional observer is competent to judge. Careful tests of the hearing by means of the voice, however, in connection with one or other of the tests mentioned, would enable a competent teacher to determine whether a subject of partial deafness could be left to participate in the ordinary school-room exercises, in common with other children, or whether it would be necessary to give the child special attention.

Following, for instance, the suggestions to be drawn from the observations of Oscar Wolf on the musical value of the vowel and consonant sounds, and the effect which diseased conditions of the ear have upon the perception of consonant and vowel sounds in combination, it is possible to arrange a series of test-words which may be used by teachers as a standard test in schools.

Each teacher may be provided with a form for tabulation of cases, which is to be preserved as a record of the degree of hearing power, accompanied by instructions as to the method of conducting the examination. These instructions should include a clear definition of the precaution.



tions to be taken in order to arrive at a correct estimate of the hearing, the personal opinion of the teacher being required only in remarks upon any other symptoms of disease of the ear, such as otorrhœa for instance, which would seem to indicate the advisability of immediate treatment. The watch and the tuning-fork, or the tones of a musical instrument, may be employed as subsidiary tests, but the main reliance should be placed on tests with the voice, for not only does the human voice, considered as a musical instrument, fulfil certain conditions as a test not otherwise attainable, but it is the voice of the teacher especially which the child is required to hear, and for the accurate hearing of which it is necessary that the child should be placed in such a position in the school-room as shall serve to compensate for its diminished hearing. As a rule, therefore, the tests indicated should be repeated on the transference of a pupil from one room, or one teacher, to another, for every human voice has its peculiarities of pitch and quality, which give it, estimated as a test, a hearing value of its own. These tests also may be repeated at intervals, without proving a great addition to the labors of the teacher, for the purpose of determining the average degree of hearing.

The hearing distance for the voice having been determined, the point in the school-room at which all the test-words are distinctly heard, should determine the position of the seat to be assigned to the pupil, such proximity to the teacher as shall enable the particularly deaf pupil to hear the teacher's voice as readily as a pupil with perfect hearing at the extreme limit of the room, being one of the compensatory advantages which his diminished hearing demands. Furthermore, the attention of the teacher should be directed to the necessity for giving such cases special attention, in such manner as to supply the loss of parts in class exercises which the pupil may have but imperfectly appreciated. A lack of knowledge on the part of teachers of the great obstacle which partial loss of hearing may present to a proper appreciation of school exercises, and the establishment of a fixed standard of instruction to which all the pupils in a class are required to conform, results in added labor on the part of the partially deaf pupil, without the consideration which his imperfect ability in this respect should command.

Passing from the consideration of those cases of partial deafness which may be provided for in the manner above proposed, we have to consider the needs of that more unfortunate class whose hearing is so far impaired as to render special instruction absolutely necessary. The objections which were made to the separate instruction of the majority of partially deaf children, do not apply here. One of the earliest and most unfortunate consequences of extreme deafness, in children, is the impairment of speech; with the loss of hearing is lost the medium through which the knowledge of speech is acquired, and the child gradually lapses into the use of gestures (to proclaim its wants) and the production of inarticulate sounds. To retain or to educate the power of speech, is, however, but one of the objects to be attained by special instruction; some means must be supplied which will compensate as far as possible for the loss of hearing, and prove another medium through which the child may receive the same education as that afforded hearing children in the common school. The sense of sight may, in these cases, be called in aid, and the child may be taught to hear, as it were, with the eyes.

Various systems for instruction in this so-called, visible speech, are in operation, and their results, as far as I have been able to observe them,

are not merely encouraging, but eminently successful. Furthermore, as every possible means of imparting instruction should be made available, in addition to education in lip-reading and articulation, such hearing as the child may possess should be utilized by the employment of artificial means, if necessary, for the readier conveyance of sound to the ear. As a result of practical experience, and not merely upon theoretical grounds, the use of the hearing-trumpet, of one kind or another according to the requirements of the case, may be advised during school exercises; indeed, in many cases, the use of such an instrument tends to improve the hearing not merely during the time of its use, but generally, the subjection of the ear to sound waves of larger amplitude either increasing the vibratory power of the sound-conducting apparatus of the middle ear, or acting as a stimulus to the auditory nerve. The proper application of these auxiliaries to instruction, necessitates therefore the formation of a separate class, for the benefit of which, as has been said, the public deaf-mute school, which now forms an important part of the Boston school system, and which must in time be engrafted upon the public school system of other large centres, may be made available.

In the Boston school, the children are divided into two general classes, those who are total deaf-mutes, and those who are semi-mutes. Children in the latter class are instructed in articulation, for the purpose of overcoming faults which always exist where the hearing is imperfect, and in lip-reading, that they may learn to understand conversation from sight as a substitute for hearing. Such hearing as remains to them is also made useful in conveying ideas as to the formation of vocal compounds, by means of an ear-trumpet, if necessary, or by speaking directly into the ear. As the total deaf-mutes improve in articulation and lip-reading, they are advanced to the class consisting of semi-mutes, partly because the grade of instruction has become the same, and partly that they may profit by the example of those more fortunate companions who have had the advantage of having a little speech or a little hearing to start with. On this plan, the Boston school has now been in operation for five years, with increasing success and increasing evidence of its great value; it now provides for about sixty pupils, all of whom are instructed in lip-reading and articulation, the method employed being the system of visible speech introduced in this country by A. Graham Bell.

The conclusions drawn from a study of the subject of this paper, may be summed up as follows:—

I. The frequency of partial deafness in children, during the period of school life, renders it advisable to make some definite provision in our public school system for compensatory instruction.

II. Since partial deafness is a comparative term, some provision should be made for a proper determination of the degree of disability.

III. This may be best accomplished either by establishing a series of speech-tests, to be used by the teachers, or by instituting competent medical examination at the hands of a medical supervisor of schools; and the creation of such an office in connection with our public school system is strongly urged.

IV. Partially deaf children, whose hearing is not so defective as to require special instruction in articulation and lip-reading, are better taught in mixed classes with those who hear well, compensatory advantages being allowed them according to their degree of disability.



V. Partially deaf children, whose hearing is so defective as to interfere with the natural acquirement of articulation, and to render the ear of little or no value as a medium for hearing, should be accorded the advantages of special instruction, of which education in articulation and lip-reading should form a part.