SCIENCE

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INSTRUCTION OF THE DEAF.[1]

THE essential difference between the oral and manual systems as methods of instruction lies in this: that with the former, articulate speech is developed, and made the chief means of communication between teacher and pupil; while with the latter, as applied in this institution, writing, spelling, and signs are developed, and made to perform the same office. Mental development and the acquisition of knowledge are the great end and aim of both systems. Intellectual development is the one prime necessity of all deaf-mute instruction, and, whatever the system pursued may be, this grand aim and object of all effort should be constantly kept in view. Of what possible use would be the power of speech with no thoughts to utter; of what avail writing or spelling with no ideas to express? The means of instruction must not be mistaken for the end: the structure reared is of vastly greater importance than the mere implements by which the work has been accomplished. Whether our pupils be instructed orally or manually, our great purpose is to make them rational, thinking beings.

In favor of the oral system, it cannot be maintained that vocal utterance is essential to the operation of the mental faculties, or that it is absolutely necessary for purposes of social intercourse, for it is well known that these ends, so indispensable to intelligent and rational existence, may be attained by other methods; nor can it be maintained for it as a system of instruction that it is superior to other systems as a means of mental development, or as an aid to the acquisition of language, although in the latter instance it certainly does possess some advantages not generally appreciated by the adherents of opposing systems.

The oral system rests its claims to superiority upon quite different grounds. Speech is a more general and more available form of communication than writing, spelling, or signing. The great hearing world, of which the deaf must ever form a very small part, speaks and understands spoken language; but too often it is unable to write, and almost always is unable to spell on the fingers or to sign. Speech, therefore, brings the deaf man who may be so fortunate as to possess it into closer relations with his hearing fellows, and affords him a wider field for the play of his ambition and for the exercise of his social instincts. Speech is the mental coin of the world. Stamped in it, the thoughts, hopes, and loves of the deaf pass current, unaffected by the existence of their physical infirmity, and without discount on account of their misfortune. It makes the whole world kin, it satisfies the innumerable daily experiences of social and business life, it meets more fully than any other form of human communication the demands of human affection. What wonder that parents thrill with delight as they catch the first feeble whisperings of speech from the lips of their deaf children! What wonder that fathers and mothers constantly ask, "May my child be taught to speak?" Surely no labor, no study, no unremitting exercise of care and attention, can be weighed in the balance with the immense benefit and consolation which speech affords to the child bereft of its hearing.

In sympathy with these views, it has been the policy of this institution for some time to provide separate oral instruction for those of its pupils who may profitably be instructed by that method. The wisdom of this policy is becoming more and more apparent in the excellent results attained, and it is only a question of time when a larger proportion of our pupils than we are now able to reach shall receive the benefit of this form of instruction.

On the other hand, for those pupils who cannot be satisfactorily instructed under the oral system, the board with equal wisdom as assiduously and carefully provides the most approved methods of manual instruction. In these features of its system of instruction, the Pennsylvania Institution enjoys a most signal advantage over any other school for the deaf in existence.

In a school in which oral instruction is alone provided, a large percentage of the pupils must derive but very little benefit; so, also, in a pure manual or combined school, a large number who might be orally taught have no adequate opportunity to acquire speech and speech-reading. In maintaining the two systems side by side in friendly rivalry as to which may most excel, it is believed that this institution, in the fulfilment of its high mission, provides every possible advantage for the instruction and advancement of its pupils: it offers speech to those who can acquire it; language, knowledge, intellectual growth, to all.

In securing the mental development of the deaf, natural signs may, without doubt, be made to perform a most important function. Their value, however, is sometimes overestimated, and their usefulness abused. Their best use, except for purposes of illustration and discipline, is found to be in the lecture-room, where are gathered together a large number of pupils for moral and religious instruction. In the classroom they should be sparingly used at all times, certainly never when written or spelled language may be used instead.

There is much diversity of opinion as to the limitations and restrictions that should be observed in the use of the language of signs. It is insisted upon by some that they should be limited to the same office and function they perform in the case of the acquisition of language by the hearing child. The gestures and actions of the mother or nurse alone give meaning to uttered words. Joy, fear, approval, love, are read in the mother's face and actions with unmistakable certainty the while the uttered sounds are being poured into the child's ears. Material objects, in the same way, are named when seen and handled; and each passing event is seized upon and made to perform an important office in impressing upon the child's memory the meaning of words and sentences.

In this way, through the agency of natural signs and gestures, the hearing child acquires speech; and in this way and to a like extent some of our most successful manual and oral teachers of the deaf employ the sign-language, and, as in the case of the hearing child, as soon as verbal forms have been acquired, they seek to discontinue their use.

[1] From the Annual Report of the Board of Directors of the Pennsylvania Institution for the Deaf and Dumb, for the Year 1889-90.

Others, again, place a much higher and more extended value upon their effectiveness as a means of development, and, instead of employing their time to perfect their pupils in the knowledge and use of that language which alone can introduce them to the world of thought and information, exert themselves to extend their acquaintance with natural and methodical signs, and to make them masters of pantomimic action. This to me is a most reprehensible practice and a complete perversion of the true use of signs in the instruction of the deaf.

Concerning the use of signs, Mr. Luzerne Rae says, "A too abundant and constant use of signs is the grand practical error of American institutions for the deaf and dumb."

Dr. E. M. Gallaudet, president of the National Deaf-Mute College, in an able article in the *American Annals*, maintains that "until a deaf-mute can think freely in conventional language, and express his thoughts fluently and correctly in the same, every instance of the use by him or to him of the language of signs in its natural order, impedes his progress toward the great end and object of his education."

In the oral instruction of the deaf, except in the earlier stages, signs as a means of communication should be carefully prohibited; in manual instruction they should be used as sparingly as possible at all stages. If the deaf are to satisfactorily acquire speech and speech-reading, they must early learn to rely upon them for all purposes of communication; and if they are to acquire fluency and correctness in the written forms of the language, they must be required constantly to express their ideas in the same. The continued general use of signs will in either case prove highly detrimental to the great end and object of instruction, and no intelligent teacher will prolong their exercise one moment after they have served their legitimate purpose. Like the scaffolding used in the erection of a building, which, however helpful and necessary during the course of construction, having served its purpose, is cast aside, with the completion of the edifice, as something not only unnecessary to the strength and duration of the structure, but as something, which, if permitted to stand, would prove a most serious debasement of its beauty and utility, so signs, however rapid and convenient and helpful they may be as means of communication and mental development, in the various stages of intellectual growth, having served their purpose, should be rigidly cast aside as debasing and detrimental to that newer and more perfect language which it is their proper function to aid in attaining. A. L. E. CROUTER.

TEMPERATURE IN THE GLACIAL EPOCH.[1]

THE late long frost has naturally suggested the question, "What permanent fall of temperature would produce a recurrence of the glacial epoch?" It is a question not easily answered, for it is like a problem complicated by too many independent variables. It is not enough for us to ascertain the actual temperature of a district in order to determine whether it will be permanently occupied by snow and ice. There are regions where the ground, a short distance below the surface, is always frozen to a depth of several yards at least; and yet glaciers do not occur, even among the hills, because the amount of precipitation is so small that the summer rapidly dissipates what the winter has collected. There are other regions partly covered by ice, though their mean annual temperature is distinctly above the freezing-point; as where glaciers descend to the sea from hilly districts, of which a considerable area lies above the snow-line, and on which there is much precipitation. In the case of Great Britain, at least, a further difficulty enters into the problem; namely, that much controversy still prevails as to the interpretation of the symbols upon which our inferences in regard to the temperature of these islands during the glacial epoch must depend. Some authorities would concede no more than that the highland districts of Scotland, Wales, and England were enveloped in snow and ice, and the glaciers, whether confluent or not, extended from their feet for a few leagues over the lowlands, say, to some part of the coast of Lancashire and of Northumberland; while others desire to envelop a large part of the British Isles in one vast winding-sheet of ice, a corner of which even rested on the brow of Muswell Hill, above the valley of the Thames. The one school regards the bowlder clay of England as a deposit mainly submarine, the product of coast-ice and floating ice in various forms: the other attributes it exclusively, or almost exclusively, to the action of land-ice. Into this thorny question we do not propose to enter. The approximation which we shall attempt — and it can only be a rough one — can be easily modified to suit the requirements of either party.

We will assume throughout that the annual isothermal of 32° coincides with the line of permanent snow. This, obviously, is an assumption. Often, owing to small precipitation, it will be found to be erroneous; but we take it as the only simple approximation, for, under favorable circumstances, masses of ice may protrude beyond it.

The question, then, may be put in this form: "Assuming a sufficient amount of precipitation, what changes of temperature are required in order to bring within the isothermal of 32° regions which are generally admitted to have been occupied by land-ice during some part of the glacial epoch?"

First, in regard to the British Isles. All will admit that in many places the Cumbrian and Cambrian glaciers descended to the present sea-level. The mean temperature of the Thames valley near London is 50° F. This isotherm cuts the Welsh coast a little east of Bangor. Obviously, the whole region north of this line has a lower mean temperature; no part of the British Isles, however, being below 45°. Hence a general fall of 18° would give a temperature of 32°, at most, in the Thames valley and on the shores of North Wales (except on the extreme west), while on the coasts farther north the temperatures would range down to 27°. What would be the effect of this? Switzerland may enable us to return an answer. The snow-line in the Bernese Oberland may be placed roughly at 8,000 feet above the sea, but it is obvious that the chief feeding-ground of the Alpine glaciers lies rather higher up in the mountains. In the case of such glaciers as the Great Aletsch, or the Aar, the lowest gaps in their upper basins are rather above 10,000 feet; while the surrounding peaks range, roughly, from 12,000 to 14,000 feet, though but few exceed 13,000 feet. Thus the feeding-ground of the Oberland glaciers may be regarded as equivalent to a mountain district the sky-line of which ranges from rather above 2,000 to 5,000 feet. In reality, however, not very much of it exceeds 4,000 feet above the snow-line. This, indeed, rather overstates the case. We find practically that the effective feeding-ground, that which gives birth to glaciers, which protrude for some distance below their supply-basins, may be placed about 1,000 feet above the ordinary snow-line; so that the glacier-generating region of Switzerland may be regarded as equivalent to a mountain district with passes about 1,500 feet, and peaks not often exceeding 3,000 feet. It follows, then, that if the temperature at the seacoast in North Wales were 32°, the whole of the Scotch Highlands, and a large part of the Cumbrian and Cambrian Hills, would become effective feeding-grounds, and the glaciers would be able to descend into the plains. In the Alps, the larger glaciers terminate at present at altitudes of from 4,000 to 5,500 feet (approximately); that is, they descend on an average about 4,000 feet below the effective feeding-ground, or 3,000 feet below the snow-line. If the temperature of Bangor were not higher than 32°, then the Snowdonian district would be comparable with one of the Alpine regions where the mountains rise generally from about 1,000 to 3,000 feet above the snow-line; that is, with such a one as the head of the Maderanerthal, where none of the peaks reach 12,000 feet above the sea. Here the Hüfi Glacier leads to passes rather below 10,000, among peaks of about 11,000 feet in altitude, and it terminates a little above 5,000 feet;

[1] From Nature.