POPULAR MISCONCEPTIONS CONCERNING PRECOCITY IN CHILDREN[1]

I

Students of the history of education know that at one time or another since Plato's day efforts have been made to hasten the development of children in respect to the acquisition of the formal branches of school instruction. Programs have been worked out with a view to teaching children to read and to write almost as soon as they should begin to talk. However, it is significant of our latter-day theories on this subject that the classical writers on education esteemed most highly in our times are distinguished because of their vigorous opposition to these forcing systems. Locke, Rousseau, Spencer, and their numerous disciples have devoted themselves to exposing the evil, as they have thought, of introducing children too early to reading, writing, arithmetic and the like, maintaining that children who were put to books too early were thereby made dull and stupid instead of intelligent and capable. These pioneers in the discussion of a rational educational régime endeavored to convince the parents and teachers of their day that the early years of life should be spent in spontaneous activities, in contact with nature, and in give-and-take relations with playmates. When Spencer took up the problem, he attempted to give scientific validity to the common-sense views of Locke and Rousseau by pointing out that it is easily possible to arrest the development of the child's brain by crowding him through subjects of study which are not suited to his stage of development. According to the Spencerian view, it is a mistake to stimulate brain areas before nature intended they should be exercised; which means, for one thing, that the child should not be taught the three R's at two or three or even four years of age. The followers of Spencer have been wont to interpret his views on this question by likening the development of the intellect to the development of the digestive and assimilative systems. If a babe be given meat before nature has prepared the organism for it, nothing but harm can result therefrom, which fact may be observed by any one who is not obsessed by notions to the contrary. Spencer brought forward biological and psychological evidence showing, as he believed, and as practically all students in this field now think, that there is a definite order in which the intellectual activities should be awakened; and if we try to upset this order in our educational programs we can hardly fail to disturb the delicate adjustments of the mind, and so to leave the individual all the weaker therefor in the end.

These views expressed by Locke, Rousseau, Spencer and many more recent students of education, biology, and psychology have profoundly influenced the thought and practise of teachers, and to a lesser extent of parents, in our own country. In some of the older countries the view is still popularly entertained that the child is a small-sized copy of the adult, possessing in miniature all the powers and faculties of a grown person. So that whatever is appropriate for the adult is also appropriate for the child, except that the doses must be reduced for the latter. It is the usual practise in certain of the schools of the Old World, and it was quite the fashion in our own schools a few decades ago, to introduce a child of four or five years of age to all the ordinary subjects of instruction in the elementary school. But the development of biological and psychological sci-

[1] Presented before Section L, American Association for the Advancement of Science, at the Minneapolis meeting.

ence in America, and its application to the problems of human life, have caused people to regard the child as different in most respects from the adult. And in his training he must receive what is adapted to his needs at different points in his evolution; which must be determined by observing him, rather than by giving him what may be suited for adults, only less of it, since he is not so large or strong. During the past few decades we have been hearing constantly that if the modes of thinking and the activities proper to an immature individual be suppressed in the child in order to rush him through the period of childhood, then the modes of thinking and the activities normal to adult life will be abortive or disordered, or they may not appear at all.

II

But within the last two or three years, teachers and parents have been thrown into a state of doubt and wonder on account of the reports which have been put in circulation to the effect that normal children two years of age or less have been taught to read readily, not only in the mother tongue, but in foreign languages; and at this tender age they have shown great facility in spelling, in numbers, and in all branches of elementary education. Recently an educational magazine published the following account of the abilities of Winifred Sackville Stoner, Jr., of Palo Alto, Cal., who was eight years of age at the time the report was made. The account says:

> She can carry on a conversation in English, French, Spanish, Latin, Esperanto, Japanese, Russian, German, Polish and Italian, while in the first five she can think as well as talk. Miss Stoner is a healthy, normal child, as fond of dolls and play as any other little girl who knows only one language. Miss Stoner is also precocious as a writer of verse, and a volume of her compositions has been published. This young lady shows not only remarkably good sense of meter and rhyme, but a keen sense of humor not often allied with precocity. This brilliant young woman of eight years walked when she was six months old, talked when eight months old, and scanned Virgil at one year of age. She can take a sheet of music for the first time, and, after looking it through once, can tell every note that was on it and its place on the staff. These are only a few of the wonderful things that Winifred Sackville Stoner can do off-hand. The interesting part of it all is that she has no one unusual natural ability, but all this, from walking at six months, talking at eight months and scanning Virgil at twelve months, is acquired skill or art, as you please, the result of the prodigious activity of her teacher, Mrs. Stoner.

During the past three years accounts of extraordinary precocity, similar to that of Winifred Stoner, have been published regarding William James Sidis, of Brookline, and other children of various ages, but all under twelve. The news has been spread abroad very generally that these children mastered the mother tongue in its oral and written forms at two or three years of age; that in a single year, at five or six, they completed the eight grades of the elementary school, and that they pushed through the high school in a year or two. While they have been accomplishing these feats, they have had leisure to go far beyond the work of either the elementary or the high school in special subjects, as in mathematics in the case of Master W. J. Sidis, for instance. The accounts of the achievements of these children have all laid emphasis on the mastery, in infancy, of reading, writing, spelling, arithmetic, grammar and a little later of geometry, astronomy and the principles of physics, chemistry, mechanics, and even history, political economy and kindred branches. These reports have all emphasized the statement that the precocious children had not been robbed of their childhood, but that they spoke and conducted themselves

as children, even though they thought as adults, and even beyond most grown persons. One reads that a certain boy of eleven, on entering college, gave lectures in higher mathematics to the professors of the institution, some of whom had grown gray in the unsuccessful attempt to solve complicated problems which this child solved easily. At the same time he would romp like any ten-year-old; and on the street or on the playground he could not be distinguished from other typical boys of his age, concealing a highly developed brain behind childish features and actions. Magazine and newspaper writers have ascribed this marvelous intellectual development wholly to a rational educational system, wherein children were taught to concentrate their attention, and never to waste their time or energy.

During the last eighteen months, the writer of this paper has listened to nine different addresses by educators in various parts of the country, all of which assumed that the accounts of the precocity of Sidis and other children were founded on fact, and that somewhat similar results could and ought to be attained in the regular work of the school. The writer has read hundreds of newspaper editorials and comments on these childish prodigies; and the gist of most of them is that our prevailing methods of teaching in the public schools are, on the whole, of more harm than good, for they waste much of the period of childhood, and develop bad mental habits in the young. Naturally these criticisms have raised in many teachers' minds the queries whether our present conception of childhood is not altogether erroneous, and whether our educational system is not entirely wrong. Already in some localities the suggestion is being made that children should enter school two or three years earlier than they commonly now do, and that they should devote themselves at the outset wholly to reading, writing, spelling, grammar and arithmetic; that work with the hands, stories of all sorts, nature study, drawing, music and the like should be eliminated from the curriculum. Statements have been made to the effect that any typical boy can be got ready for college at ten or eleven by starting him in to read at two. The chief trouble in our schools of to-day, say the newspaper writers and some educational lecturers, is that children do not learn to think correctly or effectively, because they are not trained from the beginning in the subjects which are of chief value in developing right modes of thought.

III

The present writer has attempted to get from those close to some of the precocious children referred to precise and detailed accounts of just what they had accomplished in the various branches in which they have been reported to be proficient, but nothing but general and unsatisfactory statements have been secured. So far as can be ascertained, there are accessible no really reliable data of a sufficiently detailed and specific character to enable one to determine exactly what kind of ability Miss Stoner, Jr., or Master Sidis, or any of their class possesses in reading or arithmetic or calculus or Hebrew or what not. So we must take the popular accounts, such as parents, teachers and editors are attaching importance to, and see what lessons may be drawn from them. Take reading, for instance; some of these children "can read very readily at the age of two." Now, one may learn to recognize words so that he can pronounce them, but still not be able to *read* in a true sense—that is to say, his knowledge of a word may not be anything but merely verbal. It may sug-

gest to him but a very slight part and possibly not any, of the subtle meaning which it has come to possess through a long process of development. The writer, to try out this principle, has conducted some experiments upon school children, with a view to discovering whether individuals could correctly pronounce words they did not understand in any adequate or precise manner. The method of teaching reading in the schools in which the experiments were made leads pupils to endeavor to attach some meaning to all new words in their lessons; but even so, there was not a pupil tested beyond the third grade who could not readily pronounce words which were utterly unintelligible to him, these words being chosen from the works of Shakespeare, Spencer, Emerson and Roosevelt. Practically all these pupils could easily pronounce the words in complete passages which meant nothing to them. Again, I tried these pupils in reading problems in arithmetic and theorems in geometry; and most of them could without hesitation pronounce the words in problems they could not interpret. Other tests, some of them with university students reading a foreign language, simply impressed the principle that the oral rendering of words and sentences is one thing, while the correct appreciation of them in all their significations is an altogether different thing.

It will be readily granted that the least important part of the process in reading is simple recognition of words as mere verbal forms, either visual or auditory. Most of what is vital in learning to read, and which is a test of the degree of mental development one has reached, has reference to the gaining of the meaning which words and phrases have gradually come to denote. He who can not bring these meanings before consciousness when he looks upon words, even though he can pronounce them, has not learned to read in a true sense, as this term should be understood. He has simply gained a certain degree of familiarity with a peculiar kind of visual object—an extremely simple, mechanical sort of thing, requiring no very high degree of mentality to master.

Perhaps a special phase of the general matter before us should be impressed at this point. A child, or even an adult, may be able to recognize isolated words, so that he can pronounce them, and an onlooker may say that he can read them. But reading for the gaining of content does not consist so much in dealing with isolated words, as in grasping, as a whole, the phrase, the clause or the sentence. Any good reader is largely unconscious of particular words in his reading. These fuse into larger unities, which alone convey real meaning. But a child may be taught to recognize and vocalize detached words, while at the same time he may be utterly unable to combine these into patterns in the way in which they must be actually utilized in gaining or expressing thought. One often comes across children who can call off the individual words in a sentence, but they may be utterly at sea when asked to give the meaning of this sentence. They fail to grasp it as a unity, and so it has little, if any, meaning for them.

It is a simple matter of psychology that reading for content, instead of simply for verbal recognition, can not go beyond the individual's experience with the meaning which is denoted. No one would be quite so foolish as to claim that a child of two who had had no experience outside of his nursery could read understandingly the Old Testament, for instance, or Tennyson's "In Memoriam," or Milton's "Paradise Lost." It is possible he might be taught to pronounce the words; but reading for

him would be a process simply of verbal recognition and vocal execution, and the really essential element in the reading would be entirely beyond him.

But when reports are circulated of the extraordinary reading ability of two- or three-year-old children, adults are likely to interpret the statements made from the standpoint of their own processes in reading, wherein they are concerned almost wholly with content instead of form, and they are amazed, because they can not conceive how a child of so tender an age could amass such a fund of experience as reading Plato and Shakespeare and Darwin requires. The majority of people, in their off-hand way, consider reading as a unitary process, and they jump to the conclusion that pronouncing words denotes appreciation of meaning; and herein is the foundation for one popular misconception regarding precocity as described in the public prints.

IV

Reports of the remarkable mathematical ability of four-year-old American children have been extensively circulated throughout our country and abroad. It has been said that these prodigies have worked through algebra, geometry, calculus and other branches of higher mathematics at this early age. But as in the case of reading, so here it is necessary to determine just what kind of mathematical ability is displayed by these children. The writer has tested a group of pupils in the second grade who are able to perform the fundamental operations in arithmetic, but who have no true arithmetical images or concepts. It is a simple matter of psychology that the figures *4*, *5* and *9* may be so frequently seen together in a certain special relation that when the first two are perceived the last will inevitably arise. This is nothing but a mere mechanical association of impressions—the lowest form of intellectual organization.

Again, any one who will take the trouble to look for them may find children who are able to apply the fundamental operations in a variety of ways following certain models that have been shown them, but they do not comprehend the actual situations which are symbolized by these processes. They simply manipulate figures according to a given pattern; they do not construct mentally any vital content for their symbolic operations. This latter thing is what the mature individual is constantly doing, if he has developed properly, and he is apt to assume that the child too conceives actual situations in the world of things when he solves his problems; and this is another reason for popular error in reacting upon tales of precocious children.

We might illustrate this latter point by referring to some common game, as checkers. No one will say that if a child should learn how to jump men on a checker board, imitating examples of the method given him by others, that on this account he would display any knowledge of the world of people or things about him. He would simply be required to establish a series of mechanical associations which may never be utilized anywhere in the world except on the checker board. To say that because a two-year-old child could play checkers he was therefore highly developed intellectually would be rather absurd. There are on record cases of persons wholly incompetent, even feeble minded in most things, who could carry through a game like checkers very well; and even simpler and easier is the process of arithmetical computation, which has in certain cases been developed to a marvelous extent by persons who have been imbeciles in most other respects. For a two-year-old child

to be able to play checkers would indicate simply that he had developed the power of attending to this sort of thing beyond what most normal children of this age spontaneously manifest; though if it were thought to be worth while the typical child could easily be trained to do this thing with a greater or less degree of success.

But while a two-year-old might be able to attend to the sort of situation presented on a checker board, he might at the same time be utterly deficient in attending to an unfamiliar human face so that he could recognize it the next time he saw it, and especially so that he might know whether to laugh or to cry in the presence of the stranger. It can scarcely be doubted that it requires a much higher order of intellectual process to discern the traits of a stranger in order to discover what to do with regard to him, than to learn to move checkers on a board, or to tell that six and six make twelve, or to solve a problem in cube root or quadratic equations, or to speak seven different languages, and so on. The analysis of a human personality, and the interpretation of what is observed, is a more complicated matter than the analysis of any situation presented in mathematics. More factors have to be taken account of in deciding what sort of attitude to assume toward a person than to solve any problem in calculus. And moreover, these factors are very subtly related to one another; they are plastic and dynamic, and extremely variable as compared with mathematical phenomena. One can take his time about a problem in Euclidean geometry. The relations to be discovered will not change from one moment to another; they are static and permanent. They are not affected by environing conditions, which characteristic makes them far more simple psychologically than any living thing, and especially than a human being, whose expressions, which the child must apprehend and interpret, vary with a varying environment, so that they are likely to be constantly passing from one variety into another. But even so, every normal child of two years of age is constantly analyzing living, and particularly human beings, and drawing more or less correct inferences from the phenomena observed. A typical two-year-old child knows what sort of an attitude to take toward his father and mother and brothers and sisters and servants in many of their different moods. If he has come in contact with people outside the family, he may be able to adjust himself fairly well to a considerable number of people who may differ from one another in various respects. The child of this age who has pets knows how to deal with them appropriately to their main distinguishing traits; and he will modify his attitude toward them according as their expressions change. When it comes to inanimate objects, the young child understands the essential nature of a large number of them, so that he can adapt himself to them.

From the standpoint of precocity, all this vital knowledge of living and inanimate things, which the typical two-year-old possesses, is far more wonderful than a knowledge of the forms of words, or operations with numbers, or even applying geometrical formulæ to particular problems. It seems reasonable to say that every normal five-year-old child has performed much more difficult feats in discovering the qualities of human beings say, and adjusting himself to them, than would be essential in learning to speak sentences in Spanish, French, German and Greek. This statement will doubtless be questioned by one who has not reflected upon the matter; but the reason it may seem extreme is because it is more in line with

custom and with native tendency for a young child to learn how to adapt himself to the world of people and things about him than to memorize verbal combinations. It is to be expected that people will marvel at the accomplishments of a boy of ten who can speak divers tongues, and recite geometrical demonstrations, because such feats are unusual, not because they are at all impossible for the typical child, or because they denote a superior order of mental development. What such precocious performances indicate is simply that the mind of the "prodigy" has been stimulated in these particular directions, often, if not always, to the exclusion to a greater or less extent of stimulation in the ordinary directions.

The writer has subjected certain so-called precocious children in language and the like to tests which were designed to show whether they had learned as much about nature and human nature, and had acquired as much skill in manipulating inanimate objects about them at the age of nine or ten, as the typical child whose time and energies from birth onward had been devoted largely to learning *things* as contrasted with *words* and *formulæ*. Making allowances for rare exceptions, it may be said that pupils who are precocious in speaking and reading foreign tongues, and working text-book problems in arithmetic, algebra and geometry, are distinctly inferior to the typical children of their age in their understanding of realities, and especially in effective reaction upon the environment in making it over into new forms or patterns, or directing the forces of nature into new channels. These precocious children often memorize the contents of an arithmetic say, without having any adequate notion of the realities which arithmetical processes ought to symbolize. They may learn the table of dry measure, for instance, so they can recite it off, and apply it in text-book problems, but without having any just conception of the size and relation of the units which are mentioned in the table, or any notion of how they are utilized in every-day life in facilitating the relations between human beings.

And what is true of precocity in arithmetic is true in principle of all the studies pursued in the schools, especially of such subjects as algebra, geometry, and other branches of mathematics, which are so frequently mentioned in all discussions of precocity. Marked ability in the formal aspects of these subjects, such aspects as are emphasized in the schools usually, may go along with utter incapacity in adjustment to the vital situations of life. Consider which requires the higher degree of mental development—to look on a group of algebraic symbols at leisure, change their positions according to a pattern-method which has been presented; or to discern the characteristics of a new companion who may come into a group, and to determine with celerity what he can be used for, and how he must be dealt with. The fact that the former situation is less interesting to the child than the latter should not prevent one from seeing its relative simplicity. Inasmuch as algebra, geometry, German and so on lack color, life and vitality for the young child they do not appeal to him as do the human face and many natural objects, which are so intimately bound up with his welfare. The mind of the child is unquestionably constructed on a plan whereby attention must be given primarily to people and to things as contrasted with words and symbols, because the former have played the leading rôle in human evolution. If our forbears had not shown a spontaneous interest in the realities in their environment

the race would have been eliminated long ago.

This fact may warrant the statement at this point that the study of people and of natural objects and forces should furnish the principal material for the young child's education. He must get his mental set in the direction of gaining insight, first into the qualities and needs of his fellows, and second into the constitution of nature, and the operation of her laws. Not books but realities should constitute the earliest nourishment of the mind. To give the child a set in the beginning so that he would be more interested in the symbols for realities than in the realities themselves would result in arresting his mental development, and in developing in him a type of mind capable only of working on the lower planes of mechanical association. And it is easily possible to commit this latter sort of crime. One who will look about him in the schools will not lack for evidence showing that children who have early been nurtured upon symbols have never gained a true feeling for or interest in the real world in which they must live and have their being.

One of the most interesting phases of present-day discussion of precocity is the high value which the average person puts upon the ability of a child to enter college at an unusually early age. When a boy passes college entrance examinations at the age of eleven or twelve, everyone who hears of it is likely to exclaim at his remarkable intellectual development. But one might justly say of the requirements for entering college that they are mainly verbal, conventional, and symbolic; they concern the *tools* of knowledge, not true knowledge itself. A pupil might be able to pass brilliantly in every examination for admission to many colleges, without possessing the ability to adjust himself to life efficiently. A boy might have to sit in a corner when he was among a group of his own fellows, but yet he might work out quadratic equations with success. A child might be quite incapable of using his muscles in the performance of any useful motor task, and still he might be able to demonstrate that the sum of the interior angles of a triangle equals two right angles. The college entrance examinations, speaking generally (it is not so true to-day as it was formerly) test only a low order of knowledge, mostly the variety requiring for its mastery mainly mechanical memory. The colleges themselves now appreciate this, and the problem of changing the examination system so that it may measure real ability instead of mere verbal learning is receiving attention throughout the country.

Finally, it may be said that in all times students of mental development and of education have recognized that if knowledge be presented to the child in accordance with the laws of apperception, he will progress far more rapidly in comprehending the world around him than if he be left wholly to himself, or if ignorant teachers present facts to him so that he can not grasp them and assimilate them. One who has skill and patience in leading a child always to understand what he sees about him, and to discern the laws which govern things, can in time give him a set so that he will spontaneously come to search after the real connections between the objects and phenomena he observes. It seems evident that this has been done to some extent in the case of certain children whose intellectual attainments have attracted attention during the past two or three years; and they may perhaps be said to be really precocious. However, there can be no doubt that many children have attained just as great advancement in informal education; but knowledge of

this latter kind does not attract the attention of the multitude, partly because it can not be readily tested in examination, and secondly because it is more ordinary, more common. It is the unusual thing always that arouses the wonder of people, and sets them to talking.

V

These modern instances of intellectual prodigies, then, give us no new view of human nature, and no new theory of education. They simply indicate what may be achieved in any particular direction by persistent, systematic, organized instruction. The particular intellectual achievements of these cases serves as no indication of how the majority of children ought to be trained; but they do impress the value of educational principles which are familiar to all who are in the business.

M. V. O'SHEA

THE UNIVERSITY OF WISCONSIN

THE WASHINGTON MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

THE sixty-third meeting of the American Association for the Advancement of Science, and the tenth of the "convocation week" meetings, will be held in Washington, December 27 to 30, 1911. A meeting of the executive committee of the council (consisting of the general secretary, the secretary of the council, the permanent secretary, and the secretaries of all of the sections) will be held at the office of the permanent secretary, in the New Willard Hotel, at noon, on Tuesday, December 26. The opening general session of the association will be held at 8 o'clock P.M., on Wednesday, December 27, in the main assembly hall, new U. S. National Museum. The council will meet Wednesday morning, December 27, in the New Willard Hotel at 9 o'clock. Sections will meet in their respective halls at 10 A.M. on Wednesday.

The program for the *entire meeting* will be issued on Wednesday, December 27, and copies may be obtained at the office of the permanent secretary in the New Willard Hotel.

The following events may be announced in advance:

TUESDAY, DECEMBER 26

The register for the Washington meeting will be open from 9:00 A.M. to 4:30 P.M., at the general office of the association in the Smithsonian Institution, and on following days from 9:00 A.M. to 5:00 P.M. at hotel headquarters, New Willard Hotel. The register will be open from 6:30 to 9:00 P.M. at hotel headquarters, New Willard Hotel.

WEDNESDAY, DECEMBER 27

9:00 A.M.—The council will meet in the council room at the New Willard Hotel. Registration from 9:00 A.M. to 5:00 P.M.

10:00 A.M.—The sections will meet in their respective meeting-places for organization, and where sections have programs the reading of papers will begin after organization.

2:00 P.M.—Meetings of the sections and affiliated societies.

2:30 P.M.—Addresses by retiring vice-presidents as follows: Vice-president Frankforter, before the Section of Chemistry, on "The Resins and their Chemical Relations to the Terpenes"; Vice-president Reighard, before the Section of Zoology, on "Adaptation"; Vice-president Harper, before the Section of Botany, on "Some Current Conceptions of the Germ Plasm."

8:00 P.M.—First general session of the association in the assembly hall of the new U. S. National Museum. The meeting will be called to order by the retiring president, Dr. A. A. Michelson, who will introduce the president of the meeting, Dr. Charles E. Bessey. It is expected that the address of welcome will be given by the president of the United States. Reply by President Bessey. Announcements by secretaries. Agreement on the hours of meetings. Annual address by the retiring president, Dr. A. A. Michelson, on "Recent Progress in Spectroscopic Methods." Adjournment of the general session, to be followed by an informal reception and inspection of the exhibits of the new National Museum.

THURSDAY, DECEMBER 28

9:00 A.M.—The council will meet in the council room at the New Willard Hotel. Registration from 9:00 A.M. to 5:00 P.M.