

## EDUCATIONAL PSYCHOLOGY AT THE BOSTON MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

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Readers of this JOURNAL have seen elsewhere general reports of the gathering of scientific men in Boston last December, on the occasion of the sixty-first meeting of the American Association for the Advancement of Science. Estimates of the actual number in attendance have varied somewhat widely, but the total, including those registered with the numerous affiliated organizations, was probably not far from 2000.

Educational psychology was represented upon the programs of several of these different societies. Indeed, not infrequently two or more organizations were listening at the same time to papers which were of interest to the student of this subject, and he found himself devoting much valuable time to the street-cars between Cambridge and "Tech." and the Harvard Medical School in a vain attempt to hear all that was attractive to him in the various programs. Seldom has been more clearly exemplified the increasing attention which educational psychology is receiving, and also the need for sufficient coöperation within this field to bring to a common focus these widely distributed activities.

At the opening meeting of section L, the section for Education, Professor E. L. Thorndike presented under the caption of "Units and Scales for Educational Measurement" a report upon a laborious research which is designed to perfect a scale of merit in children's hand-writing. Samples of writing were shown which had been found to represent eleven degrees of excellence, each of the equal steps in the scale being one-tenth of the difference between the

best and the poorest writing of pupils in the intermediate and grammar grades.

The discussion of Professor Thorndike's contribution was appreciative and entirely favorable until Professor Judd arose to present his paper upon *The Application of the Experimental Method to Problems in Education*. Professor Thorndike's scale, he said, was a scale for the measurement of a non-psychological *product*, whereas education is concerned not with the products but with the processes of mental development. Two samples of writing equal in merit as regards legibility and beauty may be products of vastly different degrees of development in motor coordination. One reason, said Professor Judd, why so much of the recent work upon mental tests has proven futile and valueless for education is found in the fact that it has been directed toward concrete products, instead of toward the ability to improve. The question is not, have these two pupils mastered the same subject-matter, but rather, how, by what methods, have these facts been achieved? For example, experiments upon the acquisition of skill have shown that acquisition with knowledge of the changes has a value which is lacking where the learner is unaware of the nature of the improvement, although the subject-matter acquired is identical in the two cases. Further experimental investigation of this and similar problems is needed.

Another pressing need according to Professor Judd is a determination, more exact than is possible with the questionnaire method, of the interests exhibited by children at different ages. It is also much to be desired that teachers shall make more experiments in teaching, *e. g.*, in making a well controlled comparison of the natural and the grammatical methods in language instruction. Much scattered investigation of this sort is being carried out, but it ought to be made more available, perhaps through a committee of section L which would serve as a clearing house for results and a center of information for prospective investigators.

At the conclusion of Professor Judd's paper, Professor Thorndike took his adversary into camp by granting all that had been said regarding the need for the study of mental processes, and then calling attention to the fact that any study of mental development

presupposes a comparison of products of some sort, which ought to be accurately measured. The attack was quickly renewed by Professor Judd, and the audience had the keen pleasure of hearing the rapid give-and-take of a brief but brilliant *Auseinandersetzung*.

In a penetrating and closely reasoned paper, Professor G. H. Mead urged the necessity for a scientific study of the social consciousness in education, for the reason that the psychology of instruction necessarily implies a social situation. The Herbartian psychology was criticised as being an association psychology which regards the child as an apperception-mass instead of a self among selves. The consciousness of self must be an integral part of instruction: the subject-matter must be brought into relation with the problems of the child and become a matter of personal import. How this is to be done is a problem which social psychology and scientific education must work out in detail.

Prof. W. F. Dearborn has been using the Dodge photographic method for the recording of eye-movements of children in the early grades, with a view to formulating a unit of measurement of progress in reading ability. He adduced highly suggestive but as yet hardly conclusive evidence to show that the number of ocular fixations in each line may be used as an index of the number of acts of attention, and consequently employed to discover, for example, whether a child really reads by word-wholes or by letters and syllables. Professor Dearborn has demonstrated that it is possible for the experimenter to obtain with practice a high degree of accuracy in counting the number of fixations by watching the reader's eye directly. The use of this simple method opens a promising field of investigation regarding the relative merits of various methods of teaching reading, the optimal size of type in first readers, and so on.

In reporting an inductive, statistical study of various Qualities of Merit in Teachers, Prof. W. C. Ruediger stated that he had found no correlation at all between general merit and health, while teaching skill and ability to keep order showed higher correlations with general merit than any other of the fourteen qualities rated. The correlation between merit and experience increases up to ten years and then declines. The best teachers in the elementary schools are found in the two lowest and highest grades.

At later sessions of section L were heard reports of "Scientific Studies of the American College," by Mr. E. C. Sage of the General Education Board and Professors Strayer and Thorndike of Columbia. Such studies as these mark the transition from the period of wholesale criticism and denunciation of the college to that of careful analysis and constructive suggestion.

Joint sessions of considerable interest were held with the Social Education Club, and with the American Psychological Association. A joint meeting with section B on The Teaching of Physics was also announced, but either because the meeting was rather late in the week or because none but the Physicists realized its importance, there were practically no members of section L present, if one makes exception of a few whose primary interest is in physics and who would have been in attendance anyway. Some of the propositions presented by Prof. E. H. Hall for discussion were purely technical, but others were of a more general and fundamental nature, and it is to be regretted that a larger number of specialists in education were not present to share in the discussion. Regarding the training of physics teachers it was maintained by Professor Hall that more thorough and specialized preparation in physics is necessary. Professor Woodhull and Professor Mann, on the other hand, contended that what is needed is a broader training. Physics teachers need a greater familiarity with related subjects so that their courses may be enriched and brought into closer contact with common life. The candidate for the master's degree should be encouraged to sacrifice some of his advanced courses in physics to make room for the study of education.

Ten papers relating to the teaching of chemistry were presented before one of the sections of the American Chemical Society. The American Nature Study Society had a very live session devoted to the content of the course in nature study, with especial reference to the need for more attention to the inorganic aspects of nature. On the programs of many of the other sections and societies were isolated contributions to the science of teaching.

In the list of papers presented before Section A—Mathematics and Astronomy—the only contribution dealing specifically with an educational theme was one in which Prof. D. E. Smith described

the work now being carried forward by the International Commission on the Teaching of Mathematics. This commission which originated at the international congress in Rome in 1908 had as its purpose the comparative examination of the methods of instruction and the courses of study in the secondary schools of the different nations; but the scope of its investigation has extended until it now includes elementary instruction on the one hand, and on the other the teaching of mathematics in colleges and technical schools, the preparation of mathematics teachers in normal schools and universities, and research methods and requirements for higher degrees. It is not the aim of the commission, said Professor Smith, to undertake any propaganda of reform or to strive to bring about international uniformity, but rather to serve as a clearing-house, to make it possible for each nation to see what the others are doing.

The American commission is composed of two hundred and seventy members, organized in fifteen committees and sixty-one sub-committees. When in the course of a few months their labors are completed the report will be a mine of information for the educator who is curious to know, for example, what aims are actually controlling the teaching of mathematics in the freshman year of our colleges, or how completely the subject matter drawn from the needs of modern daily life has replaced the obsolete business problems and the remains of the ancient theory of numbers which until a few years ago were looked upon as of paramount importance in the mathematics of the elementary schools.

The American Psychological Association was the guest of the Harvard department of psychology and held its sessions in the commodious rooms of Emerson Hall. One session was devoted to reports of investigations in the field of general experimental psychology and demonstrations of new apparatus, and one session each to theoretical psychology, abnormal psychology, animal psychology, educational psychology, and methods of teaching psychology. Only the programs of the last two mentioned have a sufficiently immediate interest to the student of education to warrant anything like a full report here; but some brief mention should be also made of the experimental contributions in animal

behavior, as illustrative of the present line of attack in this portion of the field of genetic psychology.

Three of these investigations were within the field of visual discrimination. Mr. L. W. Cole presented evidence that the raccoon, although a night-seeing animal, nevertheless possesses powers of color discrimination.

Dr. Florence Richardson has been gathering fresh facts regarding the place of vision in the life of the rat. By training rats to leap from one platform to another close by, and then varying the relative height and the distance between the platforms, it was shown that vision plays some small rôle in these coördinations, especially for purposes of orientation, but it does not make possible accurate perceptions of distance.

Prof. Yerkes described some rigorously controlled experiments now in progress in the Harvard laboratory, aimed to determine the limits of visual perception of size and form in the dog. The experiments brought out incidentally and unexpectedly some striking evidence of acute tactile discrimination, and emphasized the need for extreme caution against the possibility of introducing secondary criteria upon which judgments of comparison may be based. The dog in learning to choose the larger of two circles was held in leash each time until all was ready for the act of choice. The difference between the circles was gradually reduced and a fine degree of discriminative ability was attained. But this ability vanished when the experimenter abandoned the use of the leash! Such facts remind us that in experimenting with children and adults no less than with animals, extreme precautions are necessary to prevent the possibility of indications and suggestions given quite unconsciously by the experimenter.

It is surprising that but little study has been made of the behavior of the anthropoid apes. Mr. M. E. Haggerty made a preliminary report of some experiments upon a chimpanzee and two orang-outangs. The animals were required, as were the ones studied by Hobhouse, to secure food by using a hooked stick to draw it within reach and also by using a stick to poke the food out of a hollow pipe. The chimpanzee failed to solve the problems unaided, and was not helped by seeing the trick done by another

ape; but both the orang-outangs learned the use of the hooked stick at the first trial. One learned the second trick unaided and the other learned it after seeing it done by his mate. The results suggest to Mr. Haggerty that the apes offer a remarkably fertile field for the investigation of animal intelligence; that the sense-impulse theory of animal behavior is here inadequate; and that imitation probably plays a greater rôle than among the lower species.

While no thinker of the first rank has dared since the days of Herbart to advocate a "faculty psychology," the way of thinking which that opprobrious term represents seems to be perennially recurrent and to demand ever fresh refutation. Thus, Prof. W. D. Scott finds it necessary to remind us that there is no such thing as "general suggestibility." He measured the susceptibility of a group of students to suggestion regarding the colors of their after-images, and also regarding the threshold of warmth sensation. Many who were highly suggestible in the first test were not suggestible in the second, and *vice versa*. Indeed, the coefficient of correlation was practically zero.

Gathering her data from observation, from questionnaires and from other sources Miss Theodate L. Smith has made "A Genetic Study of the Psychology of Shame" in animals and children. Both in the individual and in the race, she concludes, the development of shame coincides with the development of self-consciousness, and reflects the social environment. Its moral quality is a late development and arises only when there is a content of consciousness which is felt to be in disharmony with, and unworthy of, the ideal self.

Three rather incomplete studies on the causes of retardation were summarized by Dr. F. Arnold. Obstructed breathing, artificially produced, decreased the efficiency of pupils as tested in memorizing, copying, doing arithmetic and making cross-marks. Defective vision seemed not to play any part in retardation. Arbitrary and artificial systems of grading which ignore individual differences operate to automatically retard those children varying much from the average.

The report of the Committee on the Teaching of Psychology

called forth words of high commendation from all sides. Prof. Whipple's portion, on the teaching of psychology in normal schools was based on a study of the conditions in nearly one-half of the normal schools in America. He pictured vividly the typical institution and then presented a long list of conclusions and specific recommendations. Miss Calkins described with much less detail the conditions in the forty-seven colleges she studied, and made a few definite suggestions.

A feature of the absorbingly interesting report read by President Sanford was a selection of quotations from letters of university teachers of psychology, revealing a striking diversity of aim and method. The general report, prepared by Professor Seashore, the chairman of the committee, was packed so full of meaty facts, sane recommendations and practical suggestions that any attempt at summary is futile. Fortunately for the immediate future of psychology in America, the Psychological Association voted to publish the report of the committee *in toto*, and consequently it will before many months be available for study by all teachers of psychology. The committee made suggestions looking toward action of the Association in bringing teachers of psychology in various sections of the country together for local conferences. It also proposed the organization of two committees, one on "the class experiment" and a second on "elementary experiments without laboratory apparatus." For some reason no steps were taken by the Association in any of these directions, and these matters must wait until the next annual meeting in Minneapolis, or be taken up through individual initiative.

Mention should here be made of an excellent paper read at another session of the Association by Professor J. P. Hylan, entitled, "An Instance of Intensive Teaching of Psychology." The methods used, and especially the order of topics employed, differed widely from those recommended in the general report of the committee.

Among the most notable features of any meeting of the A. A. A. S. are the addresses delivered by the retiring chairmen of the different sections and societies. At the Boston meeting four of these dealt with themes in the fields of psychology or of education.



Professor Guthe spoke before the physics section upon "Some Reforms Needed in the Teaching of Physics in our Colleges and Universities." He urged the modification of the curriculum by the addition of advanced general courses in place of some of the highly specialized courses which are at present the only ones open to prospective high-school teachers. Another needed reform lies in the direction of greater exactness and precision in the use of technical terms.

In speaking before the section of Anthropology and Psychology upon "Racial Differences in Mental Traits," Professor Woodworth contended that it is possible to account for the differences observed without assuming that they are due to differences in native ability.

In addressing the Psychological Association upon "Consciousness and Evolution," Professor Judd reminded his hearers that with the evolution of consciousness the organism becomes able, not merely to adjust itself to its environment, but also to adaptively modify the environment to itself. What this fact implies for the definition of psychology and the determination of its relations to the other sciences was illuminatingly pointed out.

An eager audience heard Professor Dewey deliver a brief address before the education section upon "Science as Method of Thinking and as Information in Education." What we want, he said, is not bits of information, but the scientific attitude. Science as method is not to be had by means of numerous short general courses in various fields of science.

Each of these presidential addresses has already been published in full in *Science* or in the *Psychological Review*.