

THE PSYCHOLOGICAL BULLETIN

PROCEEDINGS OF THE TWENTY-THIRD ANNUAL
MEETING OF THE AMERICAN PSYCHOLOGICAL
ASSOCIATION, PHILADELPHIA, PENN-
SYLVANIA, DECEMBER 29, 30, 31,
1914.

REPORT OF THE SECRETARY, R. M. OGDEN, UNIVERSITY OF KANSAS.

The American Psychological Association held its twenty-third annual meeting at the University of Pennsylvania, on Tuesday, Wednesday, and Thursday, December 29, 30 and 31, 1914, in affiliation with the American Association for the Advancement of Science, and the Southern Society for Philosophy and Psychology.

The sessions were well attended, and the program provoked much discussion of a profitable character. The outstanding feature of the program was the large number of papers reporting experimentation in the field of normal psychology. Of the forty-five papers read, sixteen were of this class. The joint session with section L of the American Association for the Advancement of Science afforded an interesting program of seven papers on educational phases of psychology, while a special session for mental tests added six papers, indicating the continued activity of the laboratories in the investigation of this important subject. At the joint session with the Southern Society for Philosophy and Psychology, a varied program of general, social, and abnormal psychology was provided. Special sessions were also devoted to physiological psychology, with six titles, and to animal and abnormal psychology, with five. As a special feature of the first session for experimental psychology, Professor J. W. Baird of Clark University offered a demonstration of the introspective method. This was followed with great interest and called forth a lively discussion upon the merits of this much discussed method

of psychological procedure. Among those participating in the discussion were Professors Calkins, Cook, Dunlap, Pillsbury, Warren, and Watson.

Place was made upon the program for the address of Professor W. B. Pillsbury, the retiring vice-president of Section H of the American Association for the Advancement of Science, "The Function and Test of Definition and Method in Psychology."

The report of the committee on the academic status of psychology, which had been appointed since the last annual meeting by the president of the Association, was read by the chairman, Professor H. C. Warren. The report was printed and distributed to all in attendance. The committee also purposes to mail copies to all instructors of psychology who contributed data upon which the results and recommendations are based. The length of the report and the varied data and recommendations which it affords, render it impossible to treat it in any adequate form in these proceedings. Reference is therefore made to the report itself with the expressed hope that every member of the Association will secure a copy and examine it with the thoughtful care which it so fully warrants.

The exhibition of apparatus was somewhat disappointing in the number of pieces shown, yet several elaborate and highly interesting devices were offered. Among the exhibits may be mentioned: an apparatus for testing visual sensibility to contrast in animals, by H. M. Johnson of the Nela Research Laboratory; an apparatus for serial exposure in memory experiments, by E. H. Cameron of Yale University; a model for an animal maze and a tactimeter, by C. Homer Bean of New York. Three pieces of apparatus were shown by Frank N. Freeman of the University of Chicago, a puzzle box for illustrating problem-solving learning and for testing mechanical ability, a form of mirror-drawing apparatus which allows modification of the movement-stimulus relation, and a mirror frame for observing eye-movements. A tachistoscope was exhibited by F. C. Dockeray of the University of Kansas, and a self-recording hand dynamometer by H. C. McComas of Princeton University. E. A. Kirkpatrick of Fitchburg, Mass., exhibited the reports on class experiments which have been gathered by the Association's committee of which he has been chairman, and, in addition, the collection of pictures of psychologists which he has assembled.

The annual dinner of the Association was held in a private

dining-room of Kugler's Restaurant on Tuesday evening, Dec. 29. One hundred and two covers were laid. Following the dinner President Woodworth read his address, entitled "A Revision of Imageless Thought," after which a smoker held the participants until a late hour.

The regular meetings of the Association took place in the Medical Clinic Room of the University Hospital, while the apparatus exhibit and sectional meetings occurred near by in the Psychological Laboratory. Under the able supervision of Professor E. B. Twitmyer, the local member of the Executive Committee, those in attendance were most cordially welcomed and their needs admirably provided for. Professors Witmer and Maxfield were also most generous in their personal hospitality.

TRANSACTIONS AT THE ANNUAL BUSINESS MEETING

The officers were elected in accordance with the plan now in force for a period of three years, this being the second year of its operation. Professor H. C. Warren, chairman of the committee on nominations elected at the New Haven meeting, presented the following report: For president, Professor John B. Watson. For members of the Council to succeed Professors Max Meyer and Margaret F. Washburn, the following four names were placed in nomination: Professors R. P. Angier, H. A. Carr, H. L. Hollingworth, and W. D. Scott.

The recommendations of the committee were accepted. The secretary was instructed to cast the vote of the Association for Professor John B. Watson as president, while the ballot of the members present showed the election of Messrs. Angier and Scott to the Council. Upon nomination of the Council, Dr. Thomas H. Haines of Columbus, Ohio, was elected representative of the Association on the Council of the American Association for the Advancement of Science.

Professor R. S. Woodworth, Professor H. C. Warren, and Professor J. R. Angell were elected members of the committee on nominations for the coming year. On recommendation of the Council, the following persons were elected to membership in the Association: I. E. Ash, Ph.D., Assistant Professor of Educational Psychology, Ohio University (Athens); C. H. Bean, Ph.D., (late Assistant Professor of Psychology in the Indiana State Normal School) Columbia University; E. G. Boring, Ph.D., Instructor in Psychology, Cornell University; J. C. Chapman, Ph.D., Assistant

Professor of Experimental Education, College for Women, Cleveland, Ohio; H. W. Chase, Ph.D., Professor of Philosophy of Education, University of North Carolina; P. W. Cobb, B.S., M.D., Physiologist, Nela Research Laboratory, Cleveland, Ohio; H. T. Eno, A.B., LL.B., Princeton, N. J.; J. M. Fletcher, Ph.D., Professor of Psychology, Tulane University; Sven Froeberg, Ph.D., Professor of Philosophy and Psychology, Upsala College; K. S. Lashley, Ph.D., Johns Hopkins University; F. N. Maxfield, Ph.D., Assistant Professor of Psychology, University of Pennsylvania; W. R. Miles, Ph.D., Carnegie Nutrition Laboratory, Boston, Mass.; David Mitchell, Ph.D., Instructor in Psychology, University of Pennsylvania; H. T. Moore, Ph.D., Instructor in Psychology, Simmons College; Josiah Morse, Ph.D., Professor of Psychology and Philosophy, University of South Carolina; F. A. C. Perrin, Ph.D., Instructor in Psychology, University of Pittsburgh; F. C. Smith, Ph.D., Assistant Professor of Psychology, University of Utah; T. F. Vance, Ph.D., Assistant Professor of Psychology, Agricultural College, Ames, Iowa.

Reports from the various standing committees of the Association were heard. The committee on the standardization of mental measurements and tests reported progress. The committee on teaching experiments reported the collection of considerable data, then upon exhibition, and asked for directions and suggestions as to future work. It was voted that the committee be continued for the purpose of carrying on its compilation of references to class experiments with a view to the publication of a complete list. The resignation of the chairman of the committee, Professor E. A. Kirkpatrick, was received.

The committee on psychology and medical education reported informally, and by vote of the Association, was continued. In the absence of the chairman of the committee on prizes, no definite report could be offered. After some discussion as to the desirability of offering prizes, it was voted to continue the committee for another year.

The report of the committee on the academic status of psychology was accepted with thanks. The following chief resolutions of the committee were then voted by the Association:

1. "That a standing committee of this Association be appointed to continue the work of this interim committee. We suggest that it include a representative of the smaller institutions, an experimentalist, a genetic or comparative psychologist, and at least one

member with practical experience in the broad psychological curriculum."

2. "That at each annual meeting of the Association some topic be chosen for discussion which bears on the teaching of psychology." This resolution was amended to provide only for the next annual meeting.

3. "That the Association adopt the principle that the undergraduate psychological curriculum in any college or university, great or small, should be planned from the standpoint of psychology and in accordance with psychological ideals, rather than to fit the needs and meet the demands of some other branch of learning."

The president of the Association reported informally upon two cases investigated by him during the past year, which concerned the dismissal, upon questionable grounds, of psychologists from positions which they had been occupying for a number of years. No action was deemed advisable in either case, but upon recommendation of the Council, it was voted to enlarge the function of the committee on the academic status of psychology to enable it to undertake similar investigations when such cases are brought before the Association, and to report upon them.

With reference to the proposed meeting at San Francisco during the Panama-Pacific International Exposition, the returns of the canvass conducted by the Secretary were read. Among 146 returns, 75 thought the proposition feasible, while 46 dissented. Forty-one indicated that they would endeavor to attend, while 91 declined.

Upon recommendation of the Council it was voted that a special meeting for the reading of papers be held in affiliation with the American Association for the Advancement of Science within the time selected by that body for its meetings, viz., between August second and seventh, 1915. The organization, program, and all other arrangements for this special meeting were placed in the hands of a committee appointed by the president. This committee consists of: Professor G. M. Stratton, of the University of California, chairman; Professor Lillien J. Martin, and Professor Warner Brown.

The place of the twenty-fourth annual meeting of the Association, which will be held at the usual time, was left to the decision of the Council. The Council's recommendation that the meeting be held at Columbus, Ohio, in affiliation with the American Association for the Advancement of Science, failed to secure a second, objection being raised that the policy of the Association was to meet in alternate years independent of the larger organization.

Upon recommendation of the Council it was voted that titles for future programs of the Association be not listed unless summaries of the papers are submitted to the Secretary before the program is made up. The effect of this action is to provide the Secretary with sufficient information to enable the proper grouping of papers with reference to their contents, and also to make possible a wider distribution of the abstracts of papers prior to the meeting. A proposal to print the abstracts is also under consideration.

The report of the treasurer was read, as printed below, and accepted.

The following appropriations were recommended by the Council and affirmed by the Association:

To defray the expense of the 1914 smoker, \$25.00.

To defray the expenses incident upon the exhibit of apparatus at the 1914 meeting, an amount not to exceed \$25.00.

To meet the expenses of the 1915 committee on nominations, an amount not to exceed \$20.00.

The Council reaffirmed the action of the preceding Council in recommending that the president's address be distributed to members of the Association. This recommendation was voted and an appropriation of \$20.00 made to cover the expense of reprints and distribution.

The Council reported a deficit of approximately \$100.00 in the estimated income of the Association for 1915 to meet the expense of the year as budgeted. To meet such exigencies a constitutional amendment was proposed to substitute for the annual subscription of \$1.00, an annual assessment to be determined each year in accordance with a budget to be prepared and adopted by the Association. After discussion, the amendment was put to a vote and lost. It was then voted that a sum not to exceed \$100.00 may be withdrawn by the Council from the principal funds of the Association to meet the current expenses of the ensuing year.

The Secretary reported the resignation of six members of the Association, and the following deaths since the last meeting: Dr. Edmund B. Huey, Johns Hopkins Hospital, on Dec. 30, 1913. Professor C. S. Minot, Harvard Medical School, on Nov. 19, 1914. Professor Arthur H. Pierce, member of the Council, 1911 to 1913, Secretary of the Association, 1908 to 1910, Smith College, on Feb. 20, 1914. Dr. Theodate L. Smith, Clark University, on Feb. 16, 1914.

Preceding adjournment, the following resolution was offered by Professor Bingham and voted unanimously:

"That the Secretary be requested to express to the local member of the Executive Committee, Professor Twitmyer, and through him to the Department of Psychology and the officers of the University of Pennsylvania, the appreciation of the American Psychological Association of the excellent facilities and many courtesies extended during this meeting."

REPORT OF THE TREASURER FOR THE YEAR 1914

Dr.	
To Balance from the previous year	\$2,887.70
Dues received from members	275.42
Interest from July 1, 1913 to July 1, 1914	97.74
Sale of monographs 51 and 53, year ending December 31, 1913	22.99
Rebate on express overcharge20
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	\$3,284.05
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By Printing and supplies	\$ 87.05
Postage	61.62
Express	7.26
Reprints of Proceedings	17.71
Expenses of secretary (1913 meeting)	24.00
Incidental expenses (1913 meeting)	26.65
Expenses of Committee on Teaching Experiments (1913)	36.35
Expenses of Committee on Mecklin Report (1913)	5.20
Expenses of Committee on Nominations (1914)	17.07
Secretary's stipend	250.00
Exchange on checks90
	<hr/>
	\$533.81
Balance in Fifth Avenue Bank	\$ 83.79
Balance in Union Dime Savings Institution	2,666.45
	<hr/>
	\$2,750.24
	<hr/>
	\$3,284.05

R. M. OGDEN,

Treasurer

Audited by the Council .

LAWRENCE, KANSAS,
December 21, 1914

ABSTRACTS OF PAPERS

STUDIES IN EXPERIMENTAL PSYCHOLOGY

The Introspective Method (with Demonstrations). J. W. BAIRD, Clark University.

Critics have objected on *a priori* grounds to the use of introspection as a scientific method; and they have advanced arguments which are alleged to prove that the method is unreliable and invalid. With scarcely an exception and with few verbal changes these arguments may be turned quite as aptly and quite as cogently against any other scientific method which the objector may choose to criticize. And a survey of the literature of psychology reveals the significant fact that the defects of introspection have been discovered solely by critics who have never employed the method save in the most crude and casual fashion; those investigators who have submitted the introspective method to a thorough-going or systematic test are unanimous in testifying to its validity.

The chief purpose of the author is to enter a plea for systematic training in the use of the introspective method. Illustrations from bacteriology and histology serve to emphasize the necessity of systematic training in accuracy of observation and in definiteness and completeness of description. Various defects of the published introspections of the current literature were cited, and means of obviating these defects were indicated. The author discussed and demonstrated the significance of a judicious selection of experimental materials, of an appropriate choice of experimental procedure, and of a suitable arrangement of experimental conditions.

A Preliminary Report of an Introspective Study of the Process of Comparing. SAMUEL W. FERNBERGER, Clark University.

Although the process of comparing is very widely employed in psychological research, inasmuch as it is the basis for the determination of a subject's sensitivity, still the structural basis of this process is far from being well understood.

In the present study, two sorts of stimuli were employed as materials for comparing. In one group of experiments, we presented a lifted weight series to our subjects; and in the other, our subjects were asked to compare the length of lines. Detailed

introspections were given immediately following each comparison judgment. Our stimuli were presented in accordance with the experimental procedure of the method of constant stimuli. Although our subjects were highly trained in the method of systematic, experimental introspection, they were quite naïve in regard to our particular experimental technique.

In general, we noted three distinct stages of mechanization of the process of comparing. (1) The initial process was characterized by a perception of the standard stimulus, followed by a perception of the comparison stimulus, with an awareness in each case of the sensations aroused by these stimuli. Some time during the perception of the comparison stimulus, there would appear in consciousness an image of the sensations attendant upon the perception of the standard stimulus. For our series in lifted weights, this image was kinæsthetic. For our visual series, a retinal comparison was sometimes made, but the criterion of comparison here was more frequently of a kinæsthetic sort, being either kinæsthesia of eye movement along the lines or kinæsthesia of eye accommodation. (2) In a later period of mechanization, the comparison stimulus was perceived in the presence of a motor set or preparation carried over from the perception of the standard stimulus; and the comparison became merely an awareness of a change in this set, along with an awareness of the direction of that change. (3) In a final stage of mechanization, this motor *Einstellung* was assumed when the subject approached the *pair* of stimuli, and the comparison was made on the basis of a mere perception of the comparison stimulus—the standard stimulus often being never clearly perceived.

The equality judgment, on the other hand, became increasingly difficult during this mechanization. This judgment was of a negative sort, *i. e.*, the non-awareness of any change in this motor preparation. This may or may not develop later into a comparison experience of positive equality.

An Experimental Investigation of the Process of Recognizing at Different Stages of its Mechanization. ELIZABETH L. WOODS, Vassar College.

This investigation aimed to determine the nature of that process which runs its course when one is aware that a given stimulus is not new. The procedure consisted in presenting novel stimuli (visual, auditory, tactual, and olfactory); and in re-presenting them in successive sittings until a stage was reached at which the

observer had become perfectly familiar with each stimulus. The observer furnished an introspective description of each experience with each stimulus, from the initial stage of the novelty, through various stages of progressive familiarization, until his reaction to it became a mechanized act accompanied by no consciousness of familiarity.

The results show that: (1) The process of recognizing is exceedingly variable, both in its temporal duration and its structural content. The number of affective and sensory contents bears a constant relation to the degree of familiarity as measured by rapidity and accuracy of recognizing. (2) The distinguishing characteristic of the process of recognizing is purely functional, and is to be conceived in terms of the behavior of attention, that is, the consciousness which (unfortunately) is usually called the "feeling of familiarity" is an attentive behavior which is characterized by: (a) The order or temporal sequence of the mental elements which comprise its structural content; (b) The relative clearness which attaches to the elements involved. (3) The particular attentive behavior, which constitutes the essence of the process of recognizing, is called forth in any given case by a certain preparedness to recognize (a recognition-attitude) which is a direct product of the situation in which the observer finds himself.

An Experimental Study of Generalizing Abstraction and the General Concept. SARAH CAROLYN FISHER, Clark University.

The purpose of this investigation was to make an introspective genetic study of generalizing abstraction and the general concept. Drawings were presented which although different were sufficiently homogeneous to constitute a class. Under each drawing appeared the fictitious group name, the observer's task being to define this name. At weekly intervals thereafter the observer was asked to recall what he could about the group name. The conclusions regarding generalizing abstraction were based on the observer's descriptions of their experiences in examining the series; those regarding the nature of the concept at different developmental levels, from their descriptions of its appearance in consciousness in response to the constant task of recalling.

The results were as follows: Generalizing abstraction consisted essentially in a certain typical behavior of consciousness and attention: Upon the instigation of the understanding of the general task of defining the group name, the chance noting of a feature

marked the initiation of a persistent tendency for the attention and fixation to return in subsequent stimuli to the region of that feature, whereupon the latter, if present, stood out immediately and clearly. The first noting of the feature was usually marked by tensions which, with or without explicit verbal self-instruction, functioned as an intention to investigate the feature. The tensions often persisted during the later examinations, and functioned as an awareness of something to be done. The easy and unhesitating moment of shift from the repeating feature as it stood out constituted essentially the experience of the similarity of the figure in respect to the feature.

The general concept underwent a series of progressive modifications in its conscious form, evolving from an initial detailed and concrete form to a final highly schematic or verbal form. The experiences that certain features were general likewise evolved from initial highly explicit perceptual or imaginal awarenesses that these features were present in every figure, to final forms which consisted in nothing more than the fact that the essential features appeared easily and uncontestedly, that they dominated consciousness and were unhesitatingly described whenever the observer was in a situation of stating what the group name meant. In this final form, the experience of generality cannot be regarded as a "consciousness" or a "knowing" that a feature was general in any save an implicit sense; it was rather a behavior that such and such a feature was general, a treatment of it as general. No essential structural difference was found between imagery of general and that of non-general features.

Influence of Expectation on Sound-Localization. L. R. GEISSLER,
University of Georgia.

The click of a telephone-receiver was presented in a horizontal plane at 30' distances from each other, with intimation that distance would be 10'. Before each stimulus the observer was instructed *either* to expect the sound from the front, back, right, or left half, or from one of the four quadrants, *or* not to expect the sound from anywhere. After stimulation the observer was to localize the sound and indicate the direction of his expectation. Each of the 20 observers made 68 localizations, and ten observers concluded their set of tests with an introspective account of the processes of localization and of expectation. Main results and conclusions: (1) The original error of sound-displacement due to the usual

front-back confusion, which in our experiments was found greatest with stimuli from the back and smallest with sounds opposite the ears, is either increased or decreased by almost half its size according as expectation is directed either to the opposite or to the same front or back half from which the stimuli are given. (2) Whether sound is expected from a well-defined point or a region in the circumference is indifferent for the accuracy of localization. (3) The negative instruction "no expectation" or "unlimited" is as a rule interpreted in the positive sense of "expectation *ad libidum*." (4) Under this instruction 50 per cent. of the sounds are expected from the right front, 37.5 per cent. from the left front, the rest from the back half. Likewise sounds are more frequently located in front than in the back. (5) This seems due to the influence of vision upon the whole mental life. (6) The 8 women observers without previous psychological training were about 10 per cent. more accurate in localizing sounds than the 12 men who had a uniform and moderate amount of special and general psychological training. (7) The left ear was uniformly about 3 per cent. more accurate than the right ear.

Awareness and Partial Awareness as Factors in Efficiency. G. F. ARPS, Ohio State University.

The data supporting this study were obtained by means of the Bergström Ergograph. The purpose of the study is to determine whether a condition of relatively complete awareness of results is productive of greater or less efficiency than a condition of partial awareness. To what extent, if any, does knowledge of results further activity; or, to what extent does a lack of knowledge restrict activity; or, is the aggregate accomplishment indifferent to differing degrees of conscious accompaniments.

The study is divided into two series of experiments alternately developed. The "known" series consists of experiments in which the observer is fully aware of his efficiency during the conduct of the experiment and of his efficiencies during previous known work periods. The "unknown" series is conducted under conditions paralleling the known except that the results are at all times closed to the observer during, as well as after the completion of, the experiment. Both the "known" and the "unknown" series consist of work periods made up of subdivisions each of which has a constant duration of ten seconds. The rests in each of the subdivisions of the periods, common to the two series, vary from zero

to ten seconds. Eleven work periods, each separated by an interval of forty-eight hours, constitute a series in which there is continuous work in the first period; rest of one second to every ten seconds of work in the second period; two seconds' rest to every ten seconds of work in the third period; and so on until the seconds of rest equal the seconds of work, *i. e.*, ten.

The results may be summarized briefly as follows: (1) Within the limits operative for the present study, both the *absolute amount* of work and the *rate* of work done under conditions of "knowledge of results" exceed that done under conditions of "ignorance of results." (2) When work is long continued and to the point of exhaustion a curious phenomenon of recovery appears which can not be entirely identified with similar phenomena peculiar to fatigue. (3) Practice effects, even though long continued, can not be eliminated. (4) The condition of "ignorance of results" is more effective in the first than in the second set of experiments because of the involuntary function of the imagination. (5) The optimal rate of work lies between $.0755 \frac{\text{KgM}}{\text{Sec.}}$ and $.0855 \frac{\text{KgM}}{\text{Sec.}}$.

External Localization in Memorizing Verbal Material. ELEANOR A. McC. GAMBLE, Wellesley College.

The experiments here reported were made by the method of right associates (*Treffer- und Zeitmethode*) with visual presentation. The material consisted of "normal" series of nonsense syllables. The peculiar features of the experiments were two: (1) The subjects learned the syllables from the sharply demarcated and symmetrically arranged fields of an exposure tablet. (2) In the test-procedure the syllables were singly exposed, in part in the same places in which they had stood during the learning-procedure and, in part, in other places. The immediate object of the experiments was to determine whether or not the syllables exposed in "right places" evoked the greater number of right associates, and syllables exposed in "wrong places" the greater number of wrong associates and "zero cases." If this is a fact it is an indirect proof of the importance of place-associations in memorizing, for in the cases of right exposure, place associations would seem to reinforce the associations between the pairs of syllables. On the other hand, if syllables exposed in wrong places are relatively unlikely to recall the proper associates, or if the reproduction-time is unduly prolonged, one may well suspect interference between two sets of associative connections.

As a matter of fact, the results show a slight but clear correlation between right exposure and right recall, and between wrong exposure and wrong recall and negative reaction. The reaction-times bear out the suppositions just formulated in regard to reinforcement and interference. Of the six subjects whose results are worth considering, three show plainly a dislocation of syllable-associations by wrong exposure, two show little disturbance, and one obtained in the case of wrong exposure an actually larger number of right associates with a much longer average reproduction-time. These last three subjects correctly localized nearly all the syllables exposed, whether in wrong or in right places, whereas the three subjects who were more evidently disturbed by wrong exposure, were frequently unable to say where a wrongly-exposed syllable had formerly stood. All the subjects but one were of the visual or mixed sensorial type. The one subject who had little visual imagery was among the three who were most disturbed by wrong exposure. Thus, disturbance by wrong exposure seems to have been coupled with weak rather than with strong place-associations. The testimony of most of the subjects reveals a deliberate use of place-associations both in memorizing and in recalling syllables.

On the Memory for Musical Sequences. KATE GORDON, Bryn Mawr College.

Tests were made for the purpose of determining whether the "meaning" of a musical selection has an appreciable effect upon the process of memorizing it. The learning of short musical lines was compared with the learning of series of nonsense syllables which were equal in length, rate of presentation, and in the number of repeated elements, to the corresponding lines of music. Both were auditory series. The results show that on the whole the music was learned more readily than the syllables, though the difference seems not to be so great as that ordinarily found between significant and non-significant material. In cases where the music and the syllables were re-learned after an interval of three or four weeks the superiority of the music was more marked.

Further tests were made in which the above musical selections were learned with the order of their notes reversed, *i. e.*, the lines were played backwards. By this device two lines may be compared which are the same in length, pitch of tones, rhythm and intervals, but which differ in musical meaning, inasmuch as a significant musical series is in general non-reversible. The results show that

the music with meaning has a decided superiority over the music with the meaning eliminated, although in the case of two unmusical subjects there was practically no difference in learning time between music played backwards and that played forwards. The original series of syllables were also learned in reversed order, and here there was a considerable saving in time of learning. Thus the nonsense material when reversed was more easily learned than before whereas the significant material when reversed was more hardly learned.

The subjects were asked to record their affective judgment on each line of music learned. There appeared to be no correlation between the agreeableness or disagreeableness of a selection and the readiness with which it was learned.

Affective Factors of Recall. G. C. MYERS, Brooklyn Training School.

In the present study, 232 subjects of normal school, high school, and grades were asked to write random lists of names of familiar things such as colors, animals, musical instruments, famous men, etc. They then were surprised by the request to write the name of the thing of each class liked best; then the thing liked least. Three forms of the test were given. In the first, the random names of each class were limited to ten; in the second and third, the time was the constant factor. In the first and third the chief-like and least-like were given regardless of the random lists; in the second, they were limited to the random lists.

The records show that the thing liked best, on the average, appears much nearer the first name in the random list than the thing liked least. Without exception, in all random lists, the percentage of cases of the chief-like are predominantly above the median, and those of the least-like, below. The least-like appeared below the chief-like in about 75 per cent. of the cases. There is no appreciable sex difference. About as great variability obtained for the likes as for the dislikes. Many irrelevant factors helped to determine the make-up of the random lists.

The data seem to be proof positive that the "disagreeable does oblivesce to a more striking degree than the pleasant." Nevertheless, all they do prove is that one tends to express the agreeable and to neglect and inhibit expression of the disagreeable. We are social creatures subject to social constraint; therefore we have social memories. What we recall as well as what we express is, in a large measure, socially determined.

Some Cases of Paramnesia. NATHAN A. HARVEY, Ypsilanti, Michigan.

The writer has collected from his classes twenty-nine cases of paramnesia, and has analyzed them in considerable detail. Paramnesia is limited to the "has-been-experienced-before" feeling. It is the identifying paramnesia of Kraepelin. It involves an error in the element of mental recognition, without any inaccuracy of the perceptive process. Twelve cases are described in which the feeling of familiarity was experienced in the midst of surroundings that had been visited before. Yet this feeling of familiarity was quite distinct from the feeling experienced five minutes afterward. Eleven of the cases describe the feeling of familiarity as occurring in places that could never have been visited before. Leaving aside the impossibility of proving in each case that a previous experience of some kind with this situation had been forgotten, the fact that a feeling of familiarity occurs in places with which the person is already acquainted, renders untenable the explanation that previously experienced elements in the situation arouse the feeling of familiarity.

Memory may be defined as the reinstatement of a previous mental experience with the same conscious elements. The two elements of memory are mental reproduction and mental recognition. Either element may occur without the other. The transmission of an impulse through the same brain center that it passed through before is the concomitant of the element of mental reproduction; the radiation of the impulse out into the same fringing cells is the concomitant of the element of mental recognition. If we may suppose, that on rare occasions the nervous impulse enters the fringing cells from some other direction than the brain center, and then immediately afterward enters the brain center, and from that direction passes into the fringing cells, we should have two experiences of the conscious elements with only one perception. Consequently the perception would seem familiar in the same way that a remembered experience seems familiar.

Individual Differences in Fluctuations of the Attention. H. C. McCOMAS, Princeton University.

The purpose of the experiment was to detect individual differences in the fluctuations of attention when directed to minimal auditory and visual stimuli. A watch in an audiometer was used for the auditory work and a quadrant of a Masson disk for the

visual. The subjects indicated the presence of the stimuli by pressing a bulb which connected with a kymograph in an adjoining room. A pneumograph gave the respiration curves; and the time was indicated by a Jaquet marker.

The records show individual differences, varying in the six subjects from an average of about 3 to 9 seconds per fluctuation. Four of the six subjects had more frequent fluctuations for visual stimuli than for auditory. They averaged one fluctuation in 7.5 seconds for auditory, and one in 5.4 seconds for visual stimuli. Two of the subjects had more frequent fluctuations for auditory than for visual stimuli. If these fluctuations are conditioned by any common factor such as variation in blood pressure it would seem that the fluctuations for the two senses should have rates more nearly alike. There were individual differences in the rates of respiration; but there is no correlation between the rate of respiration and the rate of fluctuation. This is interesting in view of the prevalent disposition to relate respiration and the fluctuations of attention. The mean variation from the averages for the several subjects shows characteristic differences. Those who show most certainty for the auditory fluctuations do so also for the visual. This may well be due to suggestion which carries over from one series to the other. A striking individual difference is in the disposition to get more fluctuations as a test proceeds. All but one subject showed this tendency in varying degrees.

Effects of Practice on the Singing and Discrimination of Tones.
E. H. CAMERON, Yale University.

Learning and Distribution of Practice in Archery. K. S. LASHLEY,
Johns Hopkins University.

Five groups of human subjects, averaging five to the group, were allowed different daily amounts of practice in shooting at a mark with the English long-bow from a constant distance. The number of arrows shot daily by each individual was for the five groups, 5, 12, 20, 40, and 60, respectively. The target was so arranged that the distance of each shot from the center of the mark could be measured accurately. No instructions were given the subjects beyond what seemed necessary for safety in handling the bow.

The small number of subjects makes it necessary to condense the records greatly in computing averages in order to eliminate

chance fluctuations. When all the first half of practice is taken as an index of initial skill, and all the second half is an index of final skill, the average improvement is, for the groups:

Shots per day	5	12	20	40	60
Improvement for equal practice.	14.2	12.2	5.3	1.8	6.5 inches.

Such averages show that a given amount of practice distributed over many days results in more rapid learning than the same amount condensed into a few long practice periods.

An Experiment in Choice Reaction. PRENTICE REEVES, Princeton University.

The experiment was designed to discover individual differences in choice reaction time. One group consisted of 45 untrained subjects; a second group included 8 subjects with some laboratory experience; a third group consisted of 6 graduates specializing in psychology. There were 4 reaction keys, each surmounted with a card bearing from 1 to 4 dots. A sliding panel behind a ground glass allowed instantaneous exposure of similar dots with a puzzle stimulus of 5 dots. Any false reaction gave a signal to the operator. The Hipp chronoscope was used. The connections were interchangeable so that different keys could be used for any dot in different series.

The choice reactions were given in series of twenty. The first two groups were not given series enough to reach a level in the practice curves. In the third group the curves indicate that after the second day there is very little further improvement with the standard order. After three hundred reactions the order of the keys was changed. The curves plotted for the second order seem to make an almost continuous curve with the first order curve, thus indicating the transfer of practice. The quickest reaction is obtained to the simplest signal regardless of the finger used. The right index finger yields in general the fastest reaction. Individual differences appear in all groups. A positive correlation was found between simple reactions and association time, but no correlation between choice reaction and association time. There is no correlation between mean variations and false reactions; and a small correlation between right and left hand reactions.

Determination of the Psychically Unitary Color-Sensations. CHRISTINE LADD-FRANKLIN, New York.

The writer has objected for some time to both the Helmholtz and the Hering color-theory on the ground (among many other

grounds) that neither of them permits recognition of the most fundamental fact concerning the discriminable chromatic sensations—the fact that they are of two distinct kinds: the exact Red, Yellow, Green and Blue are what may be described as *psychically unitary*, the others (the yellow-greens, the blue-reds, etc.) are non-unitary colors, or color-blends. (The term “mixture” should, of course, be reserved for *physical* mixtures of ether radiations.) This distinction is one which is patent to the briefest consideration, though it is wholly uninteresting in daily life, and is also wholly ignored, unfortunately, in many psychological laboratories. It was known to Leonardo da Vinci, and strongly insisted upon, among others, by Aubert. But it was obscured, for many generations, by Newton, who saw seven colors in the spectrum because there are seven notes in the tonal octave, and by the psychologists who have followed either Helmholtz or Hering. Westphal quotes the writer as authority for the statement that the real red and the real green are not complementary colors, but he complains that I do not give the method by which I have established this fact. Von Kries, also, has frequently objected that while I make much of this distinction as subversive of the other color theories, and have devised a new theory of my own to do justice to it (among other things), I nevertheless have not proved that the judgment is really one that can be formed. I have not hitherto, had proper spectroscopic facilities for this investigation, but it has lately occurred to me that in this case spectral lights are not necessary, that colored papers, in fact, are preferable. By exhibiting at once say seven colors, on discs rotated by a common electric motor, made practically equal in intensity and saturation but just noticeably different in color tone, it is found that all observers can distinguish between the unitary colors and the color-blends. The judgment is a perfectly easy one to make; none of our observers failed to make it save one, and he turned out to have dichromatic vision—which involves of course the impossibility of ever seeing a color-blend. We recommend this method for regular demonstration purposes in laboratories.

The Vowel Character of Tuning Fork Tones. A. P. WEISS, Ohio State University.

A preliminary experiment to determine the validity of W. Koehler's law: “The quality series of the phenomenal tone system are limited by absolute supra-liminal differences and each octave

is more than one octave distant." The results of the experiment support the law if the definition of "quality" is taken to mean the vowel character (*Vokalcharakter*) of tones. The forks used were between the limits of 128 and 1152 vibrations and the vowels which their tones resembled ranged through *um* (as in hum); *o* (in tone); *a* (in father); *a* (in sale); *e* (in feel). The results justify a more extensively quantitative study. M. F. Meyer has suggested the term "vocality" as a substitute for "vowel character" and in the opinion of the experimenter this term is well chosen since it expresses both a scientific fact and also one which has long been recognized as "voicing" by instrument makers.

STUDIES IN EDUCATIONAL PSYCHOLOGY AND MENTAL TESTS

The Influence of Improvement in one Simple Mental Process Upon Other Related Processes. A. T. POFFENBERGER, JR., Columbia University.

This experiment represents an effort to reduce the problem of the transfer of training to its lowest terms, namely to the formation of specific bonds or connections between situations and responses and the use of these bonds in other reactions. It differs from previous work in three particulars: First, the training series was continued long enough to bring the curves of improvement practically to a level, before the transfer effect was measured; second, an attempt was made to eliminate the more general factors which are conceded to be the source of transfer effect, such as the proper direction of the attention during the test, familiarity with psychological tests, etc.; third, the tests were so chosen that the training could be analyzed into the formation of bonds or connections between situation and response. The bonds or connections discussed are purely objective and do not refer to the underlying physiological processes. Although this must be the real seat of transfer, investigations must deal with the objective cause of such processes and the objective response resulting from such physiological action.

As an example of the type of tests used the following may be noted: Subjects were trained in the cancellation of 3's and 5's in the Number Checking blank of Woodworth and Wells. Tests before and after the training were taken in the cancellation of all groups containing the numbers 3 and 5, in the Number Group Checking blank. This case is called by Thorndike the "Entire Similar Change by the Composition of Totals," where the test

process is made up of elementary processes in which the subject had been trained.

The conclusions drawn from an interpretation of the data are as follows: (1) Where there are no identical bonds between stimulus and response in the two processes, the influence of one process upon another will be zero, *i. e.*, there will be neither transfer nor interference. (2) Where there are identical elements in the two processes, or where a given process involves one or more bonds previously formed, there will be a positive transfer effect. (3) Where one test necessitates the breaking of previously formed bonds and the formation of new ones, there will be a negative effect or an interference.

Habit Formation and Foreign Language Teaching. STUART H. ROWE, Wadleigh High School.

Many of these problems have long been discussed, but on the basis of varying experience rather than psychological principle. Prominent among these questions are those touching the analysis of the problem, the use of the so-called direct method, the place and time of translation, composition, conversation, etc., the use of imitative, play, competitive and dramatic instincts, the assistance to be gained from the emotions and interests, the extent to which repetition may be employed, how to avoid listlessness and unintentional inattention, how slow students may be speeded up, and how wrong first impressions may be avoided, etc. The analysis is really revealed in groups of habits, clustering about the processes of speaking, reading, writing, translating, and expressing thought. All of these are habits provoked by a given situation and followed by a specific sort of activity.

The direct method is preferred because it involves development of habits of vocal speech and these assist in developing an atmosphere necessary for the fullest understanding and appreciation of the written language. The ordinary translation method involves a radically different set of habits and a transference from one atmosphere to another. In the direct method translation sinks into the background. The object is to understand and be understood. It is a *test* of progress rather than a *means* of progress. Conversation and composition, also reading without translating after thought has been gained, take the place of translation. These habits are permanently good in themselves. Suggestions are made for the use of imitation, play, and the competitive and dramatic instincts.

Full use should be made of the whole recitation exercise by insisting that every recitation be made out loud and distinct. Use of the phonograph, phonetic analysis and also other devices are based on the imitative instinct. Similarly, the competitive and the dramatic instinct may be used and should form incentives and starting-points for habits of value. The emotions furnish incentives through the possibility of enlisting sympathetic admiration of a foreign people and appreciation of their culture. These are representative of a number of problems briefly answered as far as possible from a psychological point of view with the minimum of pedagogical bias.

A Method for Quantitative Study of Family Likeness in Arithmetical Abilities. MARGARET V. COBB, University of Illinois.

Some of the Courtis standard tests in arithmetic have been used as a means of measuring and comparing arithmetical facility in the members of families. The tests used were the one-minute tests in addition, subtraction, multiplication, division, and in copying figures. The measurements secured seem to be more exact than have previously been obtained in studies of the inheritance of arithmetical ability. The method has been tested on a group of twenty children and their parents. Since this includes the records of all persons over fourteen years old for whose parents records could at the time be obtained, it is not a selected group. The study shows that the method is entirely feasible, and promises to yield interesting results. The following tentative statements may be made. (1) A child may be expected to show the arithmetical characteristics of one of his parents. That is, the relations of a child's skill in each of the four simple processes to each other and to his speed in copying figures tend to be like the corresponding relations in one of his parents. (2) A child of either sex may bear this resemblance to either parent, but to one only. Pearson's correlation formula gives as the coefficients for these twenty children $+0.60$ when compared with the like, and $+0.01$ when compared with the unlike parent. (3) A child shows a greater resemblance to the like parent than to a standard taken between the records of the two parents. The Pearson coefficients are $+0.60$ and $+0.49$, respectively. (4) Many considerations point to the conclusion that this is hereditary likeness.

Relation of Initial Rate and Final Performance in Learning Experiments. E. A. KIRKPATRICK, Fitchburg, Mass.

The writer finds great individual differences in the initial and final performances of individuals in practice tests. In view of the numerous attempts to use simple tests to determine the probability of ultimate success not only in educational but also in vocational lines it is important to know how to interpret a single test or a short practice curve. It is suggested that all who make practice tests of any kind, should study the individual records as well as averages with the idea of determining the real significance of accuracy and rapidity in first tests in relation to later performances.

Notes on Certain Aspects of Learning. S. S. COLVIN, Brown University.

The first of these studies consisted of a preliminary analysis of the factors involved in learning to operate the linotype. The subject of the experiment was a skilled proof-reader, the director of the experiment an expert operator. The learner progressed normally during the early part of the test, but when he attempted to "justify" the line, all progress absolutely ended, and although the experiment was continued for forty days, the learner made no further advance. The attempt to introduce a complex and difficult act of skill, when the more simple acts had not been mechanized, caused complete failure. The learner showed marked absence of the transfer of skill in spelling and punctuation from the proof-reading situation to the linotype situation. As a proof-reader he was skilled in these particulars, but as a compositor he was wretched in both punctuation and spelling.

The object of the second study was to determine if there are any characteristic differences between the learning curves of normal and sub-normal children. In the test five normal children were compared with five sub-normal children (determined by the Binet tests). Each normal child was paired with a sub-normal child of the same mental age. The test consisted in learning to cancel a's. A comparison of the learning curves showed that in every case the normal child made greater improvement with less fluctuations than did the sub-normal child.

A somewhat more intensive study was made of one sub-normal and one normal child. There were indications that the power of attention and discrimination acquired in the "a" test was carried over in a marked degree to a later "o" test in the case of the sub-

normal child; in the case of the normal child this transfer effect was much less marked. This suggests that a fruitful field for the study of transfer may exist in the learning processes of the feeble-minded, where capacities are more isolated and in a less developed state.

Some Learning Curves. M. E. HAGGERTY, Indiana University.

This paper presents a number of curves, each showing the progress in learning during a four weeks' period. The fields of learning are arithmetic, reading, composition and writing. The subjects are college students and children in the high school and grades. The curves show that learning is quite an individual matter. Some persons improve under conditions under which other persons fail. The number losing in efficiency is large, in some cases almost as much as 40 per cent. of those practising. These results, obtained under unusually good school conditions, indicate the very great importance of knowing the individual facts about each learner. It is probable that conditions could be so adjusted that 90 per cent. of learners would improve. This was true of the experiments in reading where only one in forty-six college students failed to gain both in speed and quality.

Some Norms of College Freshmen. W. V. BINGHAM, Dartmouth College.

This paper reports the results obtained in mental tests given last year to two hundred members of the Dartmouth freshmen class. The series of tests included two motor tests: the hand dynamometer test for endurance of grip, and the tapping test; discrimination of lifted weights; memory span for auditory digits; logical memory for a paragraph of prose; cancellation; perception of form; the Woodworth and Wells tests of controlled association, including color naming, easy opposites, easy verb-object, species-genus, genus-species, part-whole, whole-part, subject-verb, verb-subject, adjective-noun, mixed relations, and harder directions. Some tests of suggestibility and of ingenuity were also tried. All of the tests were given individually except the two memory tests, which were given to groups of from eight to twelve. From the results of most of these tests, curves of percentile distribution have been plotted. These will serve as scales for quick measurement of adults in terms of their rank in a large group.

The Point Scale Method of Measuring Mental Ability. ROBERT M. YERKES, Harvard University.

The Binet Scale is avowedly a rough and ready, practical method. It is open to many serious objections, among which the following have especially influenced the writer: (1) The age-group arrangement of "tests" is unsatisfactory both in principle and because it is based upon inadequate data. (2) It is unfair to compare the intelligence of individuals on the basis of results from different sets of "tests." (3) The "all-or-none" principle applied to credits yields inaccurate and at times wholly unreliable results. (4) The Scale offers almost unlimited chance for variations in use, and numerous variations actually appear because of the bias, or other aspect of the personal equation, of the examiner. (5) It does not afford opportunity for reasonably accurate measurements of intelligence, however carefully it may be applied, nor for the obtaining of observations of value for varied comparisons of intelligence. (6) It gives no reliable indications of expected deviations, one to sex, race, or social differences. (7) It is now used in many more or less markedly differing forms and in various ways.

These and similar objections have led to a search for a new method of measuring intelligence which shall be an improvement on the Binet Scale. In the Psychopathic Hospital, Boston, and in the Cambridge public schools, we have tried out a point scale method which has many advantages over the Binet Scale. It consists of twenty problems or tasks chosen, with a few exceptions and modifications, from the Binet list. The Scale is planned for measurements of intelligence up to twelve years. Credit based upon the merit of response is given according to definite rules. The maximum credit for the twenty tasks is one hundred points.

We propose to determine the percentage value of the intelligence of large numbers of individuals, and from these data to plot distribution curves which shall indicate the normal range of variation for age, sex, race, and social groups. These curves of distribution will be used as norms. The obtaining of them will necessarily demand a large amount of careful work, but with such norms at hand, it should be possible by the Point Scale method, at the expense of no more time or labor than the application of the Binet Scale demands, to obtain much more accurate and valuable information concerning the intelligence of a given normal, defective, or pathological individual.

Point Scale Rating of Delinquent Boys and Girls. THOMAS H. HAINES, Bureau of Juvenile Research, Columbus, Ohio.

The Yerkes-Bridges Point Scale for Mental Measurement (1) puts the mental measurement device on the same self perfective basis as Sargent's Anthropometric Charts; (2) it makes it easy to plot curves summarizing the mentality, by years, of children of different races, different sexes, different social strata, and different educational advantages, which curves are immediately and directly comparable; (3) it is a much more flexible measure, making allowance for special development encouraged by specialized environments, in this way dealing more fairly with the retarded and older child; and (4) it is fairer, also, in that it allows partial credits for partial results. Nineteen of the twenty Point Scale tests being Binet tests, it is a trifling matter, when the Point Scale record is complete, to give the five or six tests necessary to complete the Binet rating. In examining two hundred delinquent minors, it was the aim, at first, to test the value of the Point Scale, by comparison with the Binet-Simon Scale. But it soon began to appear, even with the rather limited material upon which the Point Scale had been standardized, that it was a valuable and indispensable ally of the Binet Scale in estimating intelligence, and in making classification of our material by mental rating.

The Point Scale ratings run about the same in the medium to low grade morons, who average about nine years in mentality, and they run higher, by half a year, in the high grade morons, who average about eleven years. Point Scale ratings tend higher in those who test above twelve years by Binet Scale. The Point Scale throws doubt on the defect of intelligence of some who would be rated high grade morons of about 11.5 years, if judged by the Binet Scale alone.

Correlation between the Binet-Simon Tests and other Mental and Physical Tests. EDWARD K. STRONG, JR., George Peabody College for Teachers.

It was found that correlations between Binet-Simon tests and other psychological tests, such as Opposites, Logical Memory, Calculation, Form-Board, Memory-Span, etc., give surprisingly high coefficients. These coefficients average considerably more than between the Opposites Tests and other psychological tests, or, in fact, between any one of the psychological tests used and the other tests.

The coefficients of correlation were based on results from 50 children, all between 10 and 12 years of age, and ranging in general ability from markedly superior to quite dull, but containing probably no defective children. Two separate tests were made at intervals of three and one-half months, thus enabling a correction for attenuation.

These results indicate in a quite surprising manner the value of the Binet-Simon tests, since they correlate so high with the other tests.

Mentality of the Negro Compared With Whites. W. H. PYLE,
University of Missouri.

In this study, certain standard group tests were given to 408 negroes in the public schools of Columbia, Mexico and Moberly, Missouri, and the standing of the negroes compared with that of whites of the same age. Some of the more important results and inferences are as follows: The marks made by the negroes in the various tests are, in general, about two-thirds of the corresponding marks of whites. Negro girls are closer to white girls than negro boys are to white boys. Negro boys and negro girls are farther apart than are white boys and white girls. Negro girls are superior to negro boys as is the case with whites. The difference between negroes and whites grows less with age. About one-fifth of the negroes are equal or superior to the average of whites, while three-fourths of the whites are equal or superior to the average of the negroes. In the more difficult tests, the difference between negroes and whites is greater than in the easier tests. In controlled association and the Ebbinghaus Completion test, the average of the negroes is less than half the average of the whites. While in the free association and ink-blot tests, the negroes are nearly as good as the whites.

Separating the negroes into a poor and good social group and comparing the two groups shows that the negro boys of the good group make an average which is four-fifths of that of whites, and the girls, three-fourths of the average of white girls. Difference in social position has more effect on negro boys than on negro girls. The effect of social position is shown more in quickness of learning, controlled association and in the immediate and permanent logical memory tests. The good social group stands about midway between the poor group and whites.

The Standardization of Knox's Cube and Feature Profile Tests.

RUDOLF PINTNER, Ohio State University.

The Cube and Feature Profile Tests of Knox, used by him in the mental classification of immigrants, have been somewhat changed and have been given to about six hundred normal children of varying ages and to about six hundred feeble-minded individuals classified according to mental ages. An attempt has been made to standardize the various lines of the cube test, and to find out at which ages a large percentage of normal children were successful in the different steps of the test, which gradually increase in difficulty. In this way three or four groups of lines of the test seem to have proved themselves good tests for specific chronological ages. The Feature Profile Test, a test of the form-board variety, was accomplished by a large majority at age eleven, and would seem to be a good eleven-year-old test.

A comparison of these results with the results obtained from feeble-minded individuals arranged according to Binet ages shows some interesting divergences. The normal children on the whole do better on the Cube Test than feeble-minded children of the corresponding mental age, suggesting that the Binet scale may be too easy in some respects. In the Feature Profile Test the feeble-minded of the higher ages did better than normals of the corresponding chronological age, whereas the feeble-minded of the lower ages did poorer than the normals of the corresponding chronological age.

The Value of Anthropometric Measurements in the Diagnosis of Feeble-Mindedness. E. A. DOLL, Vineland Training School.

Goddard and Mead have demonstrated that the feeble-minded of all grades are below normal in height and weight, with greater abnormality in the lower grades than in the higher. The present study is an analysis by exact mental ages of psycho-physical measurements (right grip, left grip, vital capacity) as well as physical (standing height, sitting height, weight), based on data from 490 feeble-minded boys and 185 girls of all ages and grades. The analysis by mental age is made possible by comparison of the data with Smedley's percentile tables, thus eliminating chronological age by use of age-percentiles. These percentiles are averaged for each measurement, for the averages of the physical measurements, the psycho-physical, the total, and the excess of physical over psycho-physical. From these computations definite positive corre-

lations are found between mental age and all measurements. The specific character of the anthropometric "curve" is typical, and has a highly diagnostic value, the slope in particular being very highly correlated with mental defect of all degrees. Specific relationships between the several measurements and for the sexes are apparent; boys are more variable than girls, psycho-physical measurements are more variable than physical; no relation is established between variability and degree of defect. Psycho-physical measurements are much more below normal than physical, and more highly correlated with mental age. Boys are more below normal than girls in all respects except vital capacity. Weight shows the least retardation and vital capacity the most. Sitting height is more abnormal than standing and right grip more than left. The measurements hold their diagnostic value for a special group of feeble-minded cases which did not show complete feeble-mindedness when first examined, as well as for a group of normal subjects. In no case except weight for girls do as many as one fourth of the cases reach the normal average in any of the measurements. Without exception the individual "curves" for all girls slope downward, and for boys only 2 per cent. fail to slope downward, and in half of these 2 per cent. the physical average is very far below normal.

A Study in Mental Retardation in Relation to Etiology. BIRD T. BALDWIN, Swarthmore College.

The paper gives the results of a consecutive study in mental retardation and formulates a method of approach into this field of investigation from the *psycho-etiological* point of view through the presentation of physical characteristics and anthropometric measurements; pathology and treatment; systemic diagnoses—including blood counts with differential color index, Wasserman test, blood pressure and urinalysis; physical tests—for reflexes, nerve tension, strength, acuity of senses, hyperæsthesia and paralysis; mental tests—for time reaction, motor coördination, habit formation, instincts, emotion, perseverations, intelligence, learning; pedagogical advancement and improvement in self direction.

MISCELLANEOUS STUDIES

Some Relations of Mania to the Sensorium. E. E. SOUTHARD, Boston Psychopathic Hospital.

Mania, as conceived by modern workers, tends always to entail what Wernicke has called hyperkinesis. It might be natural to

seek for the sources of hyperkinesis in the kinetic brain-mechanisms. In point of fact, however, various better-known conditions of hyperkinesis, such as epilepsy and chorea, are often found related with lesions in various parts of the sensorium and may even require a certain integrity of the kinetic apparatus. A brief review is given of the reader's work showing the relations of hyperkinetic symptoms to certain lesions of the optic thalamus. New work is adduced concerning the association of mania with irritative lesions of the hinder part of the cerebral cortex (sensorium). Some other arguments are presented for the sensorial origin of hyperkinetic symptoms and for the peculiar value of the intaking nervous mechanisms for the so-called behavior-psychology.

Variations in Distribution of the Motor Centers of the Monkey Brain.

SHEPHERD IVORY FRANZ, Government Hospital for the Insane.

A special investigation of the distribution of the motor areas for the arm and leg segments in the monkey brain gave results which show a considerable individual variation in (1) the absolute extents of these areas, and (2) the relative extents of the areas for the individual segments. Furthermore, on the two hemispheres of the same animal variations in the distributions were discovered. These facts, with other allied clinical and physiological results, point to an interpretation of cerebral function in which the conception of a normal physiological variability plays an important part.

Notes on Affective Physiology. GEORGE VAN NESS DEARBORN, Tufts Medical School.

For scientific technical purposes, the conceptual division of emotional behavior potentially into eighty or more feelings and emotions should be abandoned as only traditional, thus clearing the way for adequate study of the complex basal oppositions which biologically underlie, the chief of these oppositions being that between (vegetative) impulse and (personal) control. It is an adequate thesis (for proof or disproof) that the energy-aspect of feeling consists especially of numerous sets of kinæsthetic neurokinetic impulses or strains which continually relate all layers of the great cortex to its ever-unique effective environment, the conscious inhibitory phase of the kinæsthesia representing originally, in the infant, the feeling unpleasant in tone, and its subconscious actuating phase the pleasant emotion. The actuation of movement, bodily and therethrough mental, in the naive, unfatigued and normal individual is primal and enduring delight of all his experience.

In such a personality the inherent impulse to movement in space and in time seems to be represented neurally by the actuating phase of kinæsthesia pleasant in tone whenever it rises out of the subconscious. In such a personality, too, the human restraint of impulsive movement in emotion seems to be represented by the unpleasantly conscious inhibitory phase of kinæsthesia. Organic evolution is an ever-complexifying process of control over impulse. In the triple intricacies of the great cortex is the only adequate integrating mechanism for that particular physiologic balance which is concomitant, on the usual symbolic plan, to feeling. As the child develops its personality properly human, a double kind of submergence seems to occur: figuratively, a submergence of unpleasantness in some cases into an habituated subconsciousness, and literally, perhaps, a submergence of neuronal motor control from the neopallium into the deeper layers of the cortex, the archipallium. This universal process in no way invalidates the kinæsthetic theory of feeling, since it leaves undisturbed the original primary influence on the autonomic and spinal greys as well as the secondary resultants therefrom into the cortex by way of the distributing thalamus.

Some Technical Results of the Alcohol Program. RAYMOND DODGE, Wesleyan University.

Quite apart from their indications as to the effect of alcohol, which it would be inexpedient to touch upon in the time at our disposal, the first year's experiments, under the Alcohol Program of the Nutrition Laboratory of the Carnegie Institution, give data for a critical re-examination of the practicability of the principles on which the research was based, and of the relative value of the various neuro-muscular techniques. There were three fundamental principles on which the measurable phenomena were selected, which involved a conscious departure from traditional usage in food and drug experiments on man. (1) The first principle was to secure comparable measurements of a group of neuro-muscular processes which are systematically related according to some psycho-physiological plan. At the end of the experiments, the results ought to be capable of systematic coördination on some known psycho-physical basis. (2) The Principle of Relative Simplicity demanded that we measure elementary neuro-muscular processes in their simplest available forms, and choose the more complex processes so that they involve as few unknown factors as possible. This

principle led us to commence with the simplest reflex arcs, as a basis for interpreting the more complex; to measure the sensory threshold to faradic stimulation in preference to that of senses with complex adaptive mechanisms; to measure by preference those processes that are relatively free from direct or arbitrary voluntary control of the subject. (3) The Principle of Customary Reaction required that the subject's response should be a thoroughly natural and familiar one. All three principles have been justified by the results. We have consistently comparable data from a wide variety of completely untrained subjects. The effect of repetition is small. With respect to the reliability of the different measurements as indicated by their variability, there are wide variations. With respect to the value of the various processes, as general indicators of the position of the individual within the group, it appears that coördination processes are more significant than the reaction processes. The most valuable of our measurements is the velocity of the eye movements.

The Effect of Heat, Humidity, and Stagnancy of Air Upon Mental Work. EDWARD L. THORNDIKE, Teachers College.

Our college students, when confined during four hours in a room with the temperature at 86 degrees F., the relative humidity 80 degrees, with no motion of the air save that caused by their own movements, and with the ingress of air reduced so far as possible, so that the CO₂ rose from 3 to 40 or more parts in 10,000, could do addition, cancellation, typewriting and mental multiplication (with three-place numbers) as well as under the best obtainable air-conditions. Even in work like grading handwritings or English compositions, where the subject could relax his efficiency without any observable falling below an objective standard (since neither he nor anyone else at the time knew the quality of his product), there was no difference between the best and worst air-conditions. The improvement from practice was equal in the two cases. This work, carried out by the New York State Commission on Ventilation, is now being extended by a study of the effects of long periods of exposure to the bad conditions, and by a study of the effect of the bad conditions upon willingness to do mental work.

Two Cases of Criminal Imbecility. HENRY H. GODDARD, Vineland Training School.

Case I. A sixteen-year old boy murders his former teacher, is arrested, makes a confession, is indicted, and tried for the crime.

The theory of the prosecution: Confession is taken at its full value. Circumstantial evidence is added and although no motive is discovered, the boy is supposed to have committed the deed in accordance with a long planned and well worked out scheme. The theory of the defense: The boy is feeble-minded, not responsible, and while knowing what he was doing, did not know the nature of the deed and the wrongfulness of it. The boy's confession not to be taken too seriously, because he is an imbecile. This fact being recognized, it becomes entirely possible that the whole affair was a sexual matter and thus the motive is supplied and the whole occurrence made at least intelligible.

Case II. A nineteen-year old boy in company with an older man murder an overseer. Motive of the elder man, jealousy. The boy had no motive, but a study of his confession and the circumstances makes it clear that he was acting under the suggestion of the older and stronger mind. Not having intelligence enough to resist, he does as he is told. This illustrates the power of suggestion or influence where a feeble-minded person is concerned.

Both boys had succeeded fairly well in the fifth grade of public school work, but failed absolutely and entirely to be able to do sixth grade work. The Binet examination agreed entirely with this school record.

A New Method of Studying Ideational and Allied Forms of Behavior in Man and Other Animals. ROBERT M. YERKES, Harvard University.

The writer has developed, during the past year, a multiple-choice method of studying, comparatively, ideational and allied forms of behavior in different types and conditions of organisms. The method enables an experimenter to present standardized problems of a wide range of difficulty. Thus far, it has been applied in preliminary studies of the ideational behavior of crows, pigs, normal and defective children, normal human adults, and *dementia praecox* cases. Experiments with rats and ring-doves are in progress. A brief preliminary account of the method was published several months ago, and a more detailed description of it, in the special form in which it has been used with crows, will appear early in 1915.

A Preliminary Report on Number Reactions in the Dog. A. H. SUTHERLAND, Yale University.

The Visual Difference-Threshold for Size in the Monkey and the Domestic Chick. H. M. JOHNSON, Nela Research Laboratory.

Tests were made by the discrimination method on two adult Indian game cocks and one adolescent Cebus monkey. The stimuli were two systems of striae lying in the horizontal direction, prepared by means of two Ives-Cobb visual acuity test-objects. The mean brightness of the two fields was respectively equal: 6.67 candles per square meter in the tests on the monkey and 12.2 candles per square meter in the tests on the chicks. Food and punishment in combination constituted the incentive. The range of stimuli used on the chicks, measured in width in millimeters of each dark and bright band, was from 0.74 (near the stimulus threshold) to 3.12; for the monkey, from 0.17 to 1.78, the smaller value lying near his stimulus-threshold.

One chick failed to learn the problem, being insensitive to size-difference alone and to direction-difference alone, but discriminating when a 30 per cent. size-difference was presented with a difference in direction of 90 degrees. The other chick discriminated until the width-difference was reduced to 30 to 40 per cent. of the value of the standard stimulus. The monkey gave threshold values varying between 2.6 and 15 per cent., the optimum being at 0.3 mm. for the standard. The form of the curve, percentage difference at threshold values being plotted against absolute value of the standard stimulus, suggests more than one criterion of difference, or more than one degree of attentiveness. The mean error of two human subjects instructed to judge when the value of the variable stimulus became equivalent to that of the standard, is of the same order of magnitude as the monkey's difference-threshold, within limits.

A Proposed Classification of Mental Functions. GEORGE A. COE, Union Theological Seminary.

Functional analysis of mind requires classification of functions just as structural analysis requires classification of elements. Approaches have been made toward a classification of functions: (a) Declarations of the purposive nature of mind, without a list of specific functions (Münsterberg, Ogden). (b) Declarations that all mental functions are "irradiations" from primitive hunger and love. (c) Appending to each item of structure a statement of its function (Angell). Here the list of functions is not based on differences among the functions themselves. Angell's genetic

method emphasizes the *terminus a quo*, functions are to be defined by comparison of *a quo* with *ad quem*. (d) Identification of functions with interests, and of interests with instinctive tendencies. But the resolution of the traditional "instincts" into a multitude of special adjustments (Thorndike) removes the supposed basis for classification. (e) Classifications of value are functional, but not comprehensive of all mind, nor do they ask the fundamental question, which is, In what directions does mind as a whole actually move?

The biological functions of mind are quantitative only; they imply no "better and worse," but only increase in the range of response;—(1) In space; (2) In time; (3) To different magnitudes; (4) To different qualities; (5) In degrees of coördination. Nutrition and reproduction are not functions of mind. Mind moves from them as much as toward them. It does not improve them, but re-directs them, restricting and specializing the objects operated upon, upsetting earlier equilibriums, and increasing the cost.

Mind has also preferential functions, always qualitative, implying "better and worse," and scientifically known by means of communication through language, as in the "order of merit" studies listed by Hollingworth. The preferential functions are:—(1) To be conscious; (2) To multiply objects of consciousness; (3) To control objects, oneself included; (4) To unify objects, oneself included; (5) To communicate, *i. e.*, to have in common; (6) To contemplate (æsthetic function). Play, and noëtic, ethical, economic, and religious value are absent from this list because each is a complex of functions here named. Instinctive needs are absent because mind does not satisfy instinctive desire in its initial form, but modifies the desire itself. Securing pleasures is not a mental function. The distinctive thing that the growth of mind adds to our pleasures is satisfaction in some mentally effected and controlled reorganization of objects, oneself included.

This view of functions does not make them formal and contentless. Minds mutually attaining their own freedom within the world as it is are as concrete as anything can be.

Psychology of Slavic People. PAUL R. RADOSAVLJEVICH, New York University.

An objective study of Slavic national character is indicated by their national poetry. Poets and writers show the following main characteristics: (1) *Slavic Melancholy* is a quiet, sad sigh,

which has nothing to do with sentimentality or pessimism. In very dangerous moments of life a Slav has no anger, no weakness, he is only under the spell of a peculiar sadness, combined with a deep thinking and submission to fate. Such a melancholy preserves order and insures stability of moral equilibrium. (2) *Slavic Suffering* saved Slavs from physical and moral death in the struggle with terrible elements. This highly developed power of suffering, combined with the ability to transform sudden stirrings up of the soul into the quiet feeling of melancholy, enables the Slavs to be great in adverse circumstances and to preserve mental equilibrium in the dangerous days of life. The immediate result of all this suffering is (3) *Slavic Pity, Love and Sympathy* which is the basis of *Slavic Idealism for Humanity*. The humanitarian traits of Slavic people have been the subject of study even in ancient times. (4) *Slavic Humility and Patience* is noted as opposed to the haughtiness and aggressiveness of the western European nations. (5) *Slavic Lack of Decision*, lack of conviction, lack of practical force, has the following psychological root: Talk or act in anything only after you have reasoned out well. (6) *Slavic Deep Religious Feeling* is a marked trait shown both in the practical life of the Slavic people, and in the works of such writers as Tolstoy, Dostoyevsky, Gogol, etc. (7) *Slavic Social Ideals* are best illustrated in the Russian communal village, the Servian communal household, or the Montenegrin brotherhood. On account of this common property Bakounin said that the Slavs are and always have been socialistic. But this socialism is not merely economic, but inspired by high moral and human motives. (8) *Physical Characteristics of the Slavs*. The Slavs were probably never entirely homogeneous. They evidence all varieties in the shape of head, stature and complexion.

A Study of Dreams: A Method Adapted to the Seminary. MADISON BENTLEY, University of Illinois.

Concerning the Religion of Childhood. W. T. SHEPHERD, Waynesburg College.

The paper is a report of a study being conducted by students of Waynesburg College and the writer to ascertain the ideas of children on some of the fundamental conceptions of religion, together with some of the religious feelings of childhood. Under direction of the writer, Mr. J. D. Gold and Miss Erma Tennant collected the data for this advance report of the study being conducted. So far, 25 children have been studied, of 10 to 12 years.

The questionnaire method was employed, and the children cross-questioned in order to get from them as definite expressions of their ideas on the subject as was possible.

Though the cases so far studied are not sufficient to warrant many generalizations the following propositions seem to be inferable: (1) Children of the classes studied believe in a God. (2) Children have two different conceptions of God's nature, (*a*) a spiritual one, (*b*) a physical conception. Some children have no idea on the subject. (3) There are indications that child church members have the spiritual conception of God more commonly than non-members. (4) There are indications that children 10 to 12 are more apt to conceive God as a spirit than Jesus as a spirit. Also that they are more apt to conceive Jesus as a man than in a spiritual form. (5) There are indications that most children of these ages do not fear God. (6) There are also indications that children of these ages prefer Sunday school to church service. (7) Child church members believe they should be better than non-members. Few non-members agree with them in this. (8) Some children ask God for things, and make Him promises, some do not. (9) Fewer children of these ages seem to have an idea of the Holy Ghost than of God and Jesus. Also their ideas are vaguer. (10) The study tends to confirm Starbuck's conclusion that girls are converted at earlier age than boys.