

In dealing with detectives, with the feeble-minded, the essential thing is that, as with all nervous disorders, each must be treated individually. Special care in the selection of teachers should be shown, a course in life habits should be established with provision for amusements and diversions. The object of such a school, in short, is to bring a healthy turn to the education of the feeble minded. In the light of most recent experiments with the feeble-minded, and in the light of the marvellous results in their condition, we should be wary of regarding their defects merely as nature's method of weeding out the unfit. In one sense the problem is an institutional one. But institutions as such may never be able to cope with the problem because of their vast dimensions. The problem, therefore, becomes one of social importance that should not be ignored. Ignorance about the conditions of the feeble-minded. and preconceived notions must yield; for these are stumbling blocks to all social and intellectual advancement in the line of inquiry. And ignorance and preconceived notions, it seems to me. can best be met by a hospital school properly founded and maintained.

Until we be fortunate enough to possess such a hospital school the physician and nurse must all the more necessarily work hand-in-hand. To the physician may be left diagnosis and treatment, and into the hands of the nurse is placed the great privilege of caring for the feeble-minded. Even now the nurse should be, and often is, the necessary link between the school and the home by being instructor to parents, pupils and teachers. The district nurses, especially, have additional obligations to be open-eyed. They enter homes never otherwise reached by the general practitioner or expert. It would be well could they scent disorders. They ought to ascertain and provide themselves as far as possible with the family history when a disorder is noted, and at the first possible moment to get in direct touch with an examiner for proper direction and instruction. As nurses, your talent, your training, your tact, should be brought to bear upon the difficulties and the diseases you may encounter, and your reward may be an improved community in that you have been watchful and helpful.

THE BINET AND SIMON TESTS OF INTELLIGENCE IN GRADING FEEBLE-MINDED CHILDREN*

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In a previous article the present status of the Binet-Simon tests as indicated by the results and criticisms of various writers was outlined in detail. Our object now is to present the results obtained in examining the inmates of the Minnesota School for Feeble-Minded and Colony for Epileptics so far as they throw any additional light on the value and accuracy of these tests in grading feeble-minded children. The authors' 1908 series of these tests was used throughout, just as given in my account of it in this Journal, 1911, with a few exceptions to be noted later. We shall be concerned chiefly with two questions: (1) The question as to how correctly each individual test is placed in the series and belongs in the age group in which it is found. (2) The influence of chronological age and training on the tests as means of measuring intelligence. The first is obviously fundamental in examining any class of children. The second is of special importance in examining the feeble-minded, since their greater chronological ages in general has afforded them much more opportunity for training and various acquisitions than the younger normal child of the same intelligence has had.

A. Accuracy of the Individual Tests.

1. Methods of Determining Accuracy. The series of tests is intended to represent a scale of increasing difficulty in the tasks the child is asked to perform in the tests. There are several ways in which one may proceed in determining whether each test is thus properly placed in this scale, and represents the intelligence of the average normal child of the age indicated by the age group in which the test is found.

(a) The most obvious way is to try the tests on large numbers of normal children of different chronological ages. Since

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normal children of any given age vary considerably in intelligence in both directions from an average, testing only a small number of children will not suffice, and a correct test will in a given percentage of instances give apparently incorrect results because the children tested in these instances are above or below average normal though still normal children. In order that the result may be reliable two conditions must be fulfilled. First, we must be certain that the children tested are all really normal children, which presupposes that we have some other method of determining intelligence through which we may check the accuracy of the present tests. It has been suggested that school children who are up to grade in their school work, neither advanced nor retarded, according to their chronological ages may be regarded as normal children. This assumes that the tasks set by the schools are for practical purposes in this connection accurate enough tests of intelligence, and that children are never in grades for which they cannot do the work. The latter part of this assumption is hardly always true. Secondly, the children tested must be exactly of the chronological ages indicated, and not five and a half or nearly six when they are called five, for example. As was noted in the article referred to above, neither the authors of the tests nor any of their critics, with one exception, have fulfilled both these conditions in attempting to determine the accuracy of these tests. Several have not fulfilled either. There are difficulties in the way of doing so. In regard to the first condition, not all the children found in the grades in which they belong according to their chronological ages are normal children. Some sub-normal children are always found in the lower grades at least for which they cannot do the work, but are there for a variety of reasons other than their known intelligence. Furthermore, the first two or three grades contain sub-normal children because it often requires one to three years to discover in this way that a child is really sub-normal. In attempting to fulfill the second condition stated the practical difficulty enters that comes from the fact that in any large number of children there will be but few who are exactly five, six, seven, etc., years old just at the time the tests are to be made. To be

really exact only those children should be chosen whose birthdays come near the beginning of the school year and the tests should be made at that time. If we excluded from these all that did not fulfill the first condition it would probably require several large school systems to get an adequate number of children for a second and scientifically better way of determining the accuracy of the tests is to use them on the same normal children on successive years. This has the advantage of excluding the many varying factors that enter in having different children for the different age groups of tests, and would therefore not require such large numbers. The number being small, it would also be more possible to determine through various other sources the exact grade of normal intelligence of the children. It has the disadvantage, first, that might come from the influence of the repetition of the tests on their accuracy, and, second, from the fact that it would take a number of years to complete the study, if the advantages of the method are to be realized in any degree. The method might be feasible in practice in making a final determination of the accuracy of any set of tests after a preliminary try-out has been made in other ways, and by compromising between this method and the former, by taking a small group of children of one chronological age and another group several years older and test them all at the same time for several successive years until the first group has reached the age of the second group at the beginning.

(c) A third way is to use the tests with a limited number of children whose intelligence is accurately known through long and close general observation and school work. The results of the tests may then be compared with the grading of these children on the basis of the other observations. The ages and intelligence of the children is then irrelevant, but we find in this way only whether the relative ranking of the children by the test results into different mental ages is correct or not. We do not learn whether the intelligence of a child with a given mental age as thus determined by the tests is just the same as that of a normal child of the corresponding chronological age.

a rather questionable usefulness because of the unreliability of general observations and estimations of intelligence alone, even when made by the most careful and experienced observers under the best of circumstances.

(d) A fourth way concerns more a method of treating the results of the tests than it does the kind of children tested. It compares, first, the percentage of passes for any individual test in a given age group with that of other tests in the same age group, irrespective of the chronological ages or intelligence of the children tested. In this way we determine which tests in each age group vary from the other tests in the same age group as regards the degree of difficulty the children have in passing them. If in this way some tests are found that are much easier or much more difficult than others in their group, we may next determine what children of different mental ages do with these tests in order to see in what age group these tests fit best. In this way we can get the different tests correctly arranged in a series of increasing difficulty and obtain an accurate scale, which, however, remains arbitrary to the degree in which we do not know whether the tests in any age group are correct for just that age with normal children. In attaining just this end alone this procedure is not concerned with the difficulties found in fulfilling the necessary conditions required in the first method stated above, which aims in addition at getting a definite and complete correlation between the tests of each age group and the corresponding chronological ages of normal children. The chronological ages of the children do not come into consideration. Neither does the question as to whether they are of normal intelligence. We may therefore use the results of the tests with the feeble-minded in this way to determine the relative accuracy of the individual tests, which is the object of the present study. The present results should have an additional advantage through the fact that all the children were tested by the same examiner, thus eliminating the source of error found in the combined results of others because of the lack of uniformity of procedure and of interpretation by the different examiners. Against this, the procedure has an obvious disadvantage. This is that feeble-minded children are not uniform

arrested in all the mental function. They may be nearly normal in some and relatively poor in others. If, for example, any given function is very much arrested in all or most feeble-minded children, any test particularly involving this function will then appear too difficult as compared with other tests, when as a matter of fact it may be properly placed in the scale for normal children. An attempt was made to avoid errors from this source by eliminating results from certain classes of children. These are (1) the epileptic; (2) those with special sensory defects, chiefly deafness; (3) those with any serious motor disturbance, chiefly paralysis, and choreiform movements; (4) children from whom, from a variety of different causes, the best responses they seemed capable of were not obtained. It is possible that the results are still affected in some measure by this source of error even after these eliminations.

2. Age and Intelligence of the Children Tested. After making these eliminations from about 1,300 children tested there were left 1,006 cases. The chronological ages of these ranged from two to sixty years, and the mental ages, as found by the tests, from less than a year to thirteen years. The following table will give a fair general idea of the nature of the children as regards the distribution over ages and grades.

TABLE I.

' Age'	No. Cases.	Av. Age.	Av. Men. Age
1-5.....	7	4.6	2.6
6-10.....	85	8.7	3.8
11-15.....	194	12.9	5.1
16-25.....	353	20.0	5.5
26+.....	367	36.5	5.5

3. Relative Difficulty of the Individual Tests. Each individual child was tested with only a part of the scale, the rule laid down for this being that we begin at a point in the scale considerably below that of the mental age we expect the child to have, and stopping considerably beyond the point where he has begun to fail in successive tests. No individual test was therefore given anywhere near 1,006 times. The actual number of trials each test received will be indicated in the following tables.

a. Relative difficulty within each age group. We may find

the relative difficulty of the individual tests by considering first the tests of each age group by themselves and find the percentages in which each test of a given age group is passed by all the children taking the test, irrespective, as was noted above, of their mental or chronological ages. A good measure of the relative difficulty of each test will then be its variation from the average per cent, with which all the tests of an age group are passed. These variations are given in the next table.

TABLE II.

I-II 255					III 395					IV 365													
1	2	3	4	5	6	1	2	3	4	5	1	2	3	4									
+15	+12	+10	+6	-10	-35	+21	-17	-1	-4	0	+11	+17	-16	-11									
V 526					VI 515					VII 469													
1	2	3	4	5	6	7	1	2	3	4	5	1	2	3	4	5							
+5	-4	+1	-3	+7	-30	+10	+20	-3	-24	+22	+18	-3	+5	-22	-18								
VIII 403					IX 274					X 172													
6	7	8	9	10	11	12	1	2	3	4	5	6	1	2	3	4	5	6					
+14	+13	-5	-15	-11	-36	-14	+1	+5	+10	+43	-22	-19	-16	-3	+10	+43	-22	-19	-16	-3			
XI 108					XII 53					XIII 27													
1	2	3	4	5	6	7	1	2	3	4	5	6	1	2	3	4	5	6					
+23	+26	-17	+1	-32	+6	+18	-2	-11	-10	-6	+13	-23	+14	+6	-18	+6	+23	+26	-17	+1	-32	+6	+18

the tests. The Arabic figures in the next horizontal column are the test numbers in each age group, the same numbering being followed as in my account of them referred to above. The figures with the preceding plus and minus signs give the variations in difficulty for each test, a plus sign meaning that that test is easier than the average of that age group, and a minus sign meaning that it is more difficult than the average. The large numbers following the Roman numerals give the number of children that took the tests of that age group. For any given age group this number was the same for every test in that group. The tests of the age groups I and II are those of the 1905 series and are not included in the 1908 series of the authors. Variations of twenty per cent, or over are shown in "black" type. These are the tests, then, that are considerably easier or more difficult than the others in their age group, and will be considered further. b. Tests misplaced in wrong age groups. A large plus or minus variation is in itself no proof that the test in question is

too easy or too difficult for that age group. Test VI 2, for example, which is much more difficult than others in group VI, might still be too easy for age group VII. Likewise, Test VIII 3 with a variation of plus 36 might be too difficult for age group VII. A way of determining with a fairly close approximation whether this is so or not is to find what children of different mental ages according to the system of tests as a whole do with these tests that are relatively easy or difficult. What per cent., for example, of the children with a mental age of seven who take test VI 2 pass it, as compared with the per cent. with a mental age of six that pass it? What per cent. of the children with a mental age of seven pass test VIII 3, as compared with the per cent. with a mental age of eight that pass it? If for the former less than seventy-five per cent, of the children with a mental age of seven pass X\ 2 the test is too difficult even for age group VII. If in the latter seventy-five per cent, or more of the children with a mental age of seven pass VIII 3 this test is too easy for age group VIII. In this way we may find the proper place of each test in the series as regards the degree of difficulty feeble-minded children have in passing it. These percentages are given in the next table for all those tests which in Table II showed a variation of twenty per cent, or more.

TABLE III.

III 1+				VI 2-				VI 4+				VI 6-			
2	3	5	6	6	7	8	9	5	6	7	8	6	7	8	9
N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
129	57	65	98	124	20	114	42	110	53	147	93	135	30	109	50
VI 7+				VII 4-				VIII 3+				IX 2+			
5	6	7	8	7	8	9	10	7	8	9	10	8	9	10	11
N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
118	53	153	86	115	43	73	77	117	88	96	98	68	86	45	98
IX 3-				X 1+				X 2+				X 4b-			
9	10	11	12	9	10	11	12	9	10	11	12	12	13	14	15
N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
42	40	33	61	42	95	35	100	41	90	36	100	34	38	18	72

again to the age groups and test numbers. The plus or minus signs immediately following these indicate whether the test appeared as relatively easy or difficult in Table II. The second horizontal column gives the mental ages of the children taking the

tests in question. The third horizontal column gives the total number of children for each test and the percentage that passed it. Thus, for Test III I which appeared as relatively easy in Table II, 57 per cent, of 129 children with a mental age of two years who took this test passed it. It is seen from these figures that most of the tests showing a large plus or minus variation in Table II are not misplaced in the age group in which they are found. A few, however, are clearly misplaced. These are as follows: VI 2 and 6 are too difficult for age groups VI and VII, and should probably go into VIII, on the basis of their showing in these figures. VI 6 is too difficult for age groups VI and VII. VII 4 is too difficult for age group VII. VII] 3 is too easy for age group VIII. IX 2 is too easy for age groups IX and probably also for VIII. IX 3 is too difficult for age groups IX and X. X 1 and 2 are too easy for age groups X and probably also for IX. X 4 (b) is too difficult for age group X and possibly also for XI. In these conclusions it must be noted that the exact place for a test is not always determined with certainty. VI 2, for example, is too difficult for group VII, but it may be too difficult for group VIII even. VIII 3 is too easy for group VIII, but it may be too easy for group VII also. In such instances as these we can infer the proper place of the test with approximate certainty from the size of the percentages. The required figures here are lacking because too frequently there would be no occasion to give a child with a mental age of eight the test of age group VI, or to give a child with a mental age of six the tests of age group VIII.

4. Some General Observations on Individual Tests. In several instances minor changes in the procedure in giving a test were made after the prescribed way had been tried out for some time. They probably had some effect on the difficulty of the tests and will be noted here. In IX 3 the procedure was changed to the following. The child was asked: "If you went to a store and bought a pencil for nine cents and gave the clerk a quarter, how much money would you get back?" No time limit was made use of. The answer had to be determined mentally, but if a wrong reply indicated some minor slip in the process, such as six, or fifteen, instead of an entire inability to figure it out, the child

was given a second trial. This change was made because it seemed that "playing store" was too childish an operation for children with a mental age of nine. It often spoiled the attitude of the child for following tests. For the same reason other words were substituted for those to be defined in IX 4. A child with a mental age of nine is too intelligent to be asked, "What is a fork? a chair?" etc. The words used were foot-ball, balloon, telephone, tiger, and battleship. In IX 6 it was found that the child would often not pay attention to so much direction at a time as to what to do, and would then fail in the test because he did not understand all he was to do. The authors also note this fact but seem to include this understanding of the directions as a part of the test. For feeble-minded children this seems to make this test too difficult. The procedure used for about the latter half of the cases examined was as follows: "Here are some weights. They do not all weigh the same. Some are heavy and some are light, and there are no two just alike. Lift them all like this (illustrating by lifting several successively with thumb and forefinger) and pick out the very heaviest one that is there." Then, "Now put it down here and pick out the next heaviest one and put it with this." Then, "Now pick out the next heaviest one and then the next and so on, putting them all in a row with these other two." If in the second and third trials these directions were not followed as much of them was repeated as was necessary to reduce the whole mental operation to that of merely discriminating the differences in the weights and arranging them in order. XI 1 (e) was omitted because the children often gave interpretations that did away with the nonsense of the sentence. The child was then allowed one failure in the remaining four. In XI 5 the correct sentence was given the child if he failed in the first, as a further means of showing him just what he was to do. He was also allowed two to three minutes for each of the remaining two instead of only one minute, if he showed any persistent and intelligent effort to get the sentence. This change made this test considerably easier, but was a change in the right direction as is seen in the above tables. XII 3 was regarded as passed when the first sentence with only twenty-four in

stead of twenty-six syllables was repeated without error. In addition to this it may be noted that VI 6, "giving age," is a poor test for feeble-minded children of institutions, although it may be a good test for normals. Normal children could not know their age without being told and would not keep track of it without more or less frequent occasion to think about it. Feeble-minded children living in institutions do not get these occasions, are not asked to tell their age by parents or others, and quickly lose track of it.

5. Comparison with Results of Others. The above tables show nine tests to be misplaced in the series from age groups III to XI, inclusive. In the case of six of these the results of others who have tested large numbers of normal children agree substantially. The disagreements are as follows: Goddard's figures show VI 6 as correctly placed, while Terman and Child's show it as too easy. The reason for it being specially difficult for the feeble-minded was just given above. For Goddard, Terman and Child's VII 4 is correctly placed; for Johnston, Binet and Simon (1911 series) it is too easy and for Bobertag it is too difficult. According to our figures it should go into age group VII. X 2, appearing as too easy in our figures, agrees only with Binet and Simon's 1911 revision, and disagrees with three other authors, two of whom have it as correct, and the third as too difficult. On the whole, our figures with the feeble-minded children do not indicate as many misplacements of individual tests as do the previous results of others with normal children. They agree fairly well with Goddard's figures as regards the general accuracy of the scale, and do not verify most of the larger changes indicated by the results of Terman and Child's. But as is the case with previous results, the present figures are not adequate to show anything conclusive in regard to the upper part of the scale, because the number of cases tested with these higher age group tests is again too small, while, on the other hand, they give a better indication of the status of the tests in the lower age groups.

B. The Influence of Age and Training.

See Table IV. in "The Present Status *vi* the Binet-Simon Tests." this Journal, 1912, P 131

We can only in a very general way determine off-hand whether the results with a certain test of intelligence are influenced in any serious degree by variation from the usual in the training of the particular child tested. This has become very obvious from the lack of agreement on this point among writers on the Binet-Simon tests. At the same time no statistical results are yet at hand that can throw any light on this question. When normal children are tested we usually know nothing of any special training or information any child may have that might affect the results of a test. In examining feeble-minded children this question becomes much more important. For the much larger chronological ages of the feeble-minded as compared with normal children of the same intelligence has given the former much more time and opportunity to acquire various kinds of information and skill. As Binet and Simon themselves note, the older feeble-minded person can do many more things than can the normal child of the same intelligence. But this very condition enables us to get some evidence on this question from the results of examining feeble-minded children. For if in any age group of tests any individual test is affected by training in this way the older feeble-minded person should pass this test relatively more easily than he does the other tests in that group which are not affected by training. We may arrange the results of the different tests under different chronological age groups to see whether this is the case. This is done in the next table.

TABLE IV

Age	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
6-10	-15	-10	-3	-7	-11	+10	+10	-25	-7	+9	+10	-7	-6	+4	-30
11-15	+27	-12	0	-1	-4	+19	-12	-19	-11	-11	-5	-2	-8	+7	-31
16-25	-21	-17	0	-6	-2	+19	-19	-17	-11	-3	0	-7	-2	-6	-34
26+	-22	-18	0	-6	-1	-8	+17	-3	-3	-4	-3	-3	0	+8	-27
Age	VI					VII					VIII				
6-10	+6	+6	-13	-8	-15	+18	+10	+2	0	-30	-25	+18	+19	-25	
11-15	+10	+16	0	-20	-10	+20	-2	-11	-19	-27	+19	+12	-2	-24	-7
16-25	+10	+18	0	-10	-10	+18	-2	-5	-19	-19	-11	-10	-5	-20	-12
26+	-12	-30	-3	-10	-10	-8	-5	-2	-26	-10	-19	+16	-4	-6	-16
Age	VIII					IX					X				
6-10	0	0	0	0	0	-10	-37	-22	-10	-13	-11	+19	-28	-2	-3
11-15	-38	-11	-3	-3	-17	-45	-19	-20	-21	-1	-13	+19	-25	-17	-23
16-25	-36	-11	-3	-3	-17	-45	-19	-20	-21	-1	-13	+19	-25	-17	-23
26+	-36	-11	-3	-3	-17	-45	-19	-20	-21	-1	-13	+19	-25	-17	-23

The chronological ages, arranged in five and ten year groups, are given in the vertical column on the left. The figures with the preceding plus and minus signs are obtained in the same way as those in Table II. A plus sign means again that the test in question is easier than the average in that age group, and a minus sign means the opposite. Evidence of influence of training on any test is then given when the figures with the plus signs increase from one chronological age group to the next higher, or when the figures with the minus signs decrease in this way. In order that the conclusion from these figures may be valid the assumption must be true that no test becomes more difficult with increasing chronological age. For if this were the case for any one or two tests in a given group the method of figuring would necessarily make the other tests in this age group appear as becoming easier with increasing chronological age. But there hardly seems any possibility of this assumption not being true. What now do the figures of this table indicate? For those tests for which any tendency towards an influence of training is shown at all the figures are given in "black" type. These tests call for the following tasks: III 1. showing eyes, nose and mouth. III 5, giving full name. IV 3, repeating three numerals. V 2, copying a square. V 4, counting four pennies. VI 4, defining words according to use. VII 5, repeating five numerals. VII 8, naming four common pieces of money., VIII 1, reading a given passage. IX 2, naming the days of the week. X 1 naming the months of the year. Figures for the higher age groups are not given because the number of children tested for the different chronological ages was too small, below thirty for a test and each chronological age group. Of these tests III 1, 5, V 4, VII 8, IX 2, X 1 concern the formation of the simplest kinds of associations, and we would expect this kind of test to be influenced by age and training if any are. VIII 1 has already been dropped from the series by the authors because of influence of training. IV 3. and VII 5 are concerned chiefly with memory, a mental function which in itself seems not to be particularly arrested in feeble-minded, and which therefore goes on improving in an approximately normal way with increasing age, though it is not much affected by training. VI 4 concerns very largely the develop-

of language, and language is one thing above all others in which all children receive persistent training. This leaves only V 2, copying a square, to be accounted for. That is, the figures in this table agree with what we know about the nature of the mental processes involved in the tasks of the tests that the figures indicate as affected by age and training. But no great stress is to be put on this sort of analysis and explanation, for if we proceeded in the same manner with other tests we would find a number which ought to be influenced by age and training for which the figures in the table do not show any such influence. Besides, it is seen that the apparent influence of age and training is very small in some of the cases mentioned, and may be due to merely accidental variations in the figures, that is, to minor, unknown causes. The important conclusion that remains is that age and training have not affected enough tests seriously enough to cause any great errors in the mental ages from this source. The increasing ability of the children to pass certain tests with increasing chronological age is not very marked. Data in the previous tables showed that any test must have a plus or minus variation of at least 20 before it was found to be too easy or too difficult for its age group. For a test to become too easy for an age group through the influence of age and training it should show an increase of at least 20 in the plus variation or a decrease of 20 in the minus variation with increasing age. This is true only of IV 3, VI 4, and VII 8.

C. Value of the Scale in Grading Feeble-Minded Children.

I. As an Arbitrary Scale. Aside from the question whether the mental ages obtained with the tests are always exactly correct

the scale could still have a great value if by means of it we got an accurate arbitrary ranking of the children tested. In this case the scale would give ten arbitrary grades represented by the mental ages of three to twelve years, inclusive. It would not seriously detract from its merits if these grades did not represent equal steps of increase in general intelligence, but varied from this equality in unknown ways. As a matter of fact, we know that if the mental ages obtained were absolutely correct in all cases they would not represent equal steps of progress in mental development. The}' would give steps decreasing irregularly in

size from three to twelve years because the normal rate of mental development from year to year varies in this way. And we are far from knowing" just how the course of this rate runs with normal children when we deal with its quantitative aspect. It is further, therefore, entirely possible that the tests are too difficult in the upper part of the scale and too easy in the lower part, as has been held, while yet the mental ages obtained with them may represent correctly successive steps in mental development. If this is the case, the question then becomes not whether a child for whom the tests give a mental age of five, for example, is of exactly the intelligence of a normal child of five years chronologically, but whether the child with a mental age of five is always brighter than one with a mental age of four, and never as bright as one with a mental age of six, according to the tests. We are then concerned with the question of the range of variability from correct results, not with the question of any constant error in a given direction. In the writer's opinion this range of variability from correct results depends more on the examiner than it does on any inherent characteristics of the tests themselves. Under the same conditions the tests give the same results. It is the function of the examiner to keep these conditions the same, or to make the proper allowances where he cannot control them. This means that he should understand the tests and children, that he should give the tests always in the same way and know how to adapt details to particular circumstances met with the individual child; that he should interpret results always in the same way and be able to recognize special conditions which call for different interpretations of results. A trained examiner thoroughly familiar with the use of the tests should not make very frequent serious errors in the mental ages obtained.

2. As Compared with the Usual Method of Grading. In judging the value of the tests in grading feeble-minded children, however, we cannot base our conclusions entirely *on* the degree of accuracy of the tests alone, but must compare them with other means at hand. How much more accurate and useful are the tests than anything else we have? In institutions the usual procedure has been to grade the children from general observations by those best qualified to make those observations. We have

always known that frequent errors are made in this way because two different observers will rarely agree on the grading of any group of children in question. But the magnitude of such errors has never been determined. The writer obtained some results which throw some light on this question, though his object at the time concerned another matter. A list of one hundred and fifty children with mental ages of eight to twelve inclusive was made out, and from this list each of the teachers of the school was asked to make out a new list of all those children whom she thought she knew well enough to grade accurately. They were asked to classify them into the grades A, B, and C, with two doubtful grades, one between A and B, and the other between B and C, thus making five grades. Each teacher was to exclude all cases from her list to be graded which she could not definitely place in one of these five grades. Further detailed instructions were given and discussed, the main points in which were that all the children on the list were mentally eight to twelve years, but that they should base their classifications on their own observations alone chiefly, and, if the observations of attendants or others were taken into account, that care should be taken to distinguish between expressed opinion as to grade and observed facts as to what a child could do. Emphasis was put *on* the request for each teacher to do the grading independently of the opinion of others or knowledge of the mental ages if these happened to be known. Over two months were used in which to do the grading during which time preliminary classifications were to be verified and special observations made on those children whose grades remained at all in doubt. The reasons for this procedure cannot be discussed here further than to state that it was a plan intended to eliminate as many as possible of the various sources of error met in grading children in this way. From the total results obtained all those children were then picked out who had been graded by at least three different teachers. The grading of these children is given in the following table:

The first horizontal column gives the cases, from 1 to 50. The chronological ages are given next, then the mental ages under "M. A." and next the average grades of the teachers under "T. A." In the last the A, A-B, B, B-C, and C grades of the

through the fact that it requires only about an hour to examine a child with the tests in place of weeks or months of general observation to get similar results. The economy of time on the part of the examiner may not be counted, but the importance for the children of being promptly and correctly graded so that they may be placed at once where the institution can serve them best will hardly be disputed.

3. Needed Additions to the Scale. The authors devised the scale of tests mostly to meet the requirements of examining public school children, and for this purpose the tests are well adapted. But the schools for the feeble-minded and other institutions have need of a means of diagnosing mental deficiency in children before they enter school, and also in the older children and adults after they have left school. There is a general feeling, based on certain well known facts that very much more could be done in many cases of feeble-mindedness if the deficiency could be recognized at or soon after birth. How far this is really true can never be determined until we have a more accurate means of diagnosing deficiency at an early age. With such means at hand a new held of endeavor would be opened. In any case, the schools for feeble-minded are constantly called upon to pass on the mentality of children before they reach the age of three, the point at which the present scale of tests begins. Observations on the development of the child during the first three years have been slowly accumulating, and it seems quite possible that tests could be devised that would enable us to extend the scale downward to birth and in smaller steps than whole years of mental growth.

The need of additions to the upper end of the scale is at present more imperative than the former. The tests are not entirely adequate for determining small differences in intelligence of older children or adults near the borderline of the normal. It is just at this point that there is a special call for making small distinctions with accuracy and certainty. The difference between the just slightly feeble-minded and the lowest intelligence that we call normal may not be significant from the scientific standpoint of psychology. But from the standpoint of the disposal society is to make of the individual it becomes all important, for society no less than for the individual. We have at present

nothing that meets this demand. Opinions of experts based on general observations is usually worthless at this point, a fact proven conclusively enough by the constant disagreement of such experts. A method from which the personal factor of the observer is mostly eliminated, such as mental tests alone can give, is required.

D. Summary.

1. Nine of the individual tests are too easy or too difficult for the age group in which they are placed. Some of these need to be shifted by more than a year up or down the scale.

2. Minor changes in the procedure in giving a test are required in several instances.

3. The present results with the feeble-minded agree quite well with previous results with normal children as regards the degree of general accuracy of the scale. They do not verify the larger and more frequent errors obtained with the tests by some authors. The test results are much more accurate on the whole than are the gradings of the feeble-minded by experienced observers without the use of tests.

4. Some influence of chronological age and training detracting from their value as tests of intelligence is present in a number of instances. But in only three tests is this influence found to be great enough to make the test in question too easy for the age group in which it is placed.

5. There is much demand for additional tests that would extend both the lower and upper ends of the scale, the former to make the earliest possible diagnosis of mental deficiency in infancy, the latter to determine with accuracy and certainty small differences in intelligence of older children and adults at the borderline of normal intelligence.

DISCUSSION

Dr. Goodard: I am deeply interested in this paper of Dr. Kuhlmann's and in the results which he has found. This splendid arrangement of his results is certainly a contribution and I am very much pleased to be able to confirm his findings almost entirely. (Dr. Goodard then placed his charts showing drawings

by children tested, further illustrating the wonderful results obtained through these test.)

Dr. Lange: I shall try to be very brief in my discussion. I would like to say a little more about the charts Dr. Kuhlmann put up for us. I have very few cases who have not been able to name the four colors. I think that test is not even a seven-year-old test but a five-year-old test. I think if we take a general view of the Binet test it is a very splendid test to determine the relative standing of a group of children. As a diagnostic means to decide whether a child is feeble-minded or not, I do not think it is of any value whatever. \Ye have in the (Glenwood institution twenty-two children of whom three tested one year ahead of their age; six tested just exactly their right age; five , one year later than their real age, and eight two years later. The three children are normal. Of all the others, especially of the six testing their real age, there is not the slightest doubt about their being

feeble-minded. If we can depend upon the Binet test absolutely these children would not have been sent to our institution at all. Yet there is no doubt that these children are feeble-minded and their proper place is in the institution. The same is the case with those who are one year retarded and those who are two years retarded. I have found that very few feeble-minded children can tell the names of the days of the week. But go to the custodial group and ask them the same question and there is hardly one in this class who cannot answer the question accurately. This certainly is training. In the test of "How old are you?" I found a queer thing — a child gives the age he was when he came to the institution. No one is interested in his age after coming to the institution and he never hears it mentioned. At home it was different and so he remembers and tells his age as it was when he came from home. This also is a matter of training.

It seems to me that we must be very careful what we are doing with these tests and what we think we can do with them.

ted that the officers of the juvenile courts

I answer in this way. It is absolutely

necessary for an experienced person to make the Binet

up_

doing. It has been suggested

should be able to use these test

test.

Dr. Goddard: May I have just a word expressing my very

emphatic disagreement with Dr. Lange in that last statement. I do this because I think the future of the movement of using these tests depends upon this question. I think the fact that we have data showing that children tested five times by five different people and passing the same way, absolutely refutes that. I believe that the Binet tests are useful and that any person by temperament at all fitted to be near children can use them with accuracy. I believe that if a child is more than three years backward he is absolutely feeble-minded. It will be a dreadful calamity if these tests are confined to institutions; it will also be dreadful if we confine them to psychology.

Dr. Lange: : I do not want you to have the impression that I do not believe the Binet test a good thing. I believe in the tests and think that they are the best we have at present, but I do think they should be changed to suit the locality in which the test is made, and that some of the tests are entirely too easy and others too hard, for the ages given.

Dr. Murdoch: It seems to me that Dr. Lange's experiments are a wonderful contribution to the Binet test. I think that this is a very trivial matter in the general question of the test to a few borderline cases. I think the whole subject is wonderful.

Professor Johns' reference to the question of preliminary examination. Even and is deluged with letters making inquiries along this line. Several times attempts have been made to start something of the kind. It seems to me that this association, as an association, should select some five, ten or fifty points that they want to know about and each institution take at least one of them and find out facts. Then we could have them tabulated some way and get some accurate idea. I believe that there should be a committee appointed at this meeting to determine what are to be the ten most important things necessary for us to take up.