

## THE AVERAGE MENTAL AGE OF ADULTS

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Three years ago Professor Lewis M. Terman came to the conclusion that the average mental age of adults is approximately 16 years. This conclusion is still generally accepted and still determines the calculation of intelligence quotients. Terman based his conclusion on the fact that the median mental age of a fair number of supposedly unselected adults proved to be 16 years by the Stanford revision of the Binet-Simon scale. Terman made no attempt logically to explain the fact nor to elaborate the various implications of his conclusion. Arthur S. Otis, however, by logical analysis and by the application of results obtained by Terman and Kuhlman, showed that the curves of distribution of intelligence at different age groups tended to approach each other more and more closely until the curves of distribution for ages above 16 practically coincided with the 16-year curve. Otis, therefore, concluded for logical reasons, making use of the best data available, that 16 years was the upper limit of intelligence development on the average. Strangely enough, these conclusions aroused comparatively little discussion, but were accepted practically at face value. Many psychologists were surprised that the average intelligence of adults proved to be so low, but those who experimented for themselves, came rather generally to the same conclusion as did Terman. A few isolated studies showed that the intelligence of different social classes and of different occupational groups varied rather definitely, but no attempt was made to obtain any large number of really unselected adults, made up of the representative proportions of the different social levels that are found in society at large.

Psychological examining in the Army, however, has indicated that for unselected adults, as judged by draft recruits, a mental age of 16 years is in all probability much too high for the American average adult, at least as he was observed in the Army. The results of the application of group tests at different Army cantonments indicated wide differences in intelligence according to geographical sections of the country. They indicated very important influences of selections, even in groups of over ten thousand. It was also found that occupa-

tional groups were of strikingly different levels of average intelligence. Furthermore, such studies as were made of foreign-born and negroes, indicated very striking differences according to nationality and race.

Perhaps it is too early to come to any general conclusions regarding the significance of the Army data. Perhaps it is impossible for any one man at any one or even several camps to come to a final conclusion, because of the differences just mentioned in the selected nature of supposedly unselected groups. The fallibility of statistics based even on thousands of cases was amply demonstrated in the Army examining. In spite of highly objective methods, which were almost totally independent of any personal equation of examining and scoring, the different camps reported strikingly different results, and even the same camps reported striking variations. At Camp Dix, for example, the average intelligence scores of successive draft quotas became progressively lower during the period of January to August 1918, although apparently there was no good reason why they should do so. For these and for other reasons, it is advisable to wait until the Surgeon-General of the Army or the National Research Council presents the official results of psychological examining in the Army. The present writer, however, has found so much demand for statements of the Army results, and so much need for revision of former concepts, that he feels it is now very desirable to present some sort of statement, even if it be only preliminary, regarding the average intelligence of adults as seen in the Army. In so doing he will present only very general conclusions. In his own work on return to civil life, the writer has found these conclusions of very practical value, and substantially correct. He confesses, for one, that his own previous opinions of the average intelligence of adults were very much distorted by limited experience and by failure adequately to weight the various experimental groups on which his previous conclusions had been based. The adult population of the State of New Jersey, for example, includes such heavy proportions of foreigners and unskilled laborers that the supposedly unselected groups previously observed by the writer now seem to have been very definitely selected in favor of superior intelligence on the basis of social standing.

#### THE INTELLIGENCE OF ARMY RECRUITS

The following table throws some light on the average intelligence of adults in terms of mental age, and compares native whites, foreign-born, and negroes:

## MENTAL AGES OF ARMY RECRUITS BY NATIONALITY AND COLOR

Army Letter-Grade Rating	Equivalent Mental Age	Native White %	Foreign born %	Negro %	Army as Whole*
Illiterate		17	72	62	30
D—	under 9 5	5	55	39	10
D	9 5—10 9	15	29	28	15
C—	11 0—12 9	21	8	16	20
C	13 0—14 9	27	7	10	25
C+	15 0—16 4	19	1	4	17
B	16 5—17 9	9		2	9
A	18 0—19 5	4		1	4
Total Number		9,500	3,700	3,300	1,500,000
Lower quartile (approx.)		11 5	below 9 5	below 9 5	11 0
Median Mental age (approx.)		13 5	9 5	10 0	13 5
Upper quartile (approx.)		15 5	10 5	12 0	15 5

\* Observe that the percentages in this column correspond closely to the weighted average percentages obtained by combining the three preceding columns.

The column headed "equivalent mental age," is obtained from the *Basis for the Assignment of Letter Grades*, Appendix A, of the *Examiner's Guide for Psychological Examining in the Army* (Page 91). The column headed "native whites" is based on approximately 9,500 men of the July draft at Camp Dix, New Jersey. The column headed "foreign-born" is based on approximately 3,700 foreign-born men chiefly southern Italians, Russians and Russian Poles from the July draft at Camp Dix, New Jersey. The data of these two columns are embodied in a report from Lieut. Chas. L. Harlan to the Surgeon-General of the Army, entitled "A Study of Foreign-born Men in the July Draft." The column headed "negro" is based upon approximately 3,300 negroes of the July draft at Camp Dix, New Jersey. The data of this column were obtained from a report to the Surgeon-General entitled "A Study of the Intelligence of Negro Recruits," by Lieut. Edgar A. Doll with the assistance of Lieut. Arthur Kornhauser. The column headed "Army as a whole" is obtained from data presented on page 5 of *Army Mental Tests*, Washington, D. C., November, 1918.

The significance of the table is obvious. The median men-

tal age of the total Army proves to be about 13.5 years. This median presumably includes native whites, foreign-born, and negroes. This median is not substantially different from that obtained for native whites at Camp Dix, but as has been previously mentioned, a median based on any one camp, or on less than many thousands of cases, is not entirely dependable. At Camp Taylor, for example, there were very striking differences between the average intelligence of regiments in the same brigade. We may, however, conclude with a fair degree of safety, that the average of totally unselected adults, regardless of nationality and color, is approximately 13 to 14 years.

The other columns of the table indicate striking differences between native whites, foreign-born, and negroes. The average mental age of native whites is 13.5 years, and of foreign-born and negroes is approximately 10 years.

In considering the average mentality of foreign-born it must be clearly understood that there is no implication that these foreign-born adequately represent the average intelligence of their country. On the contrary it is commonly recognized that the type of immigrant received in this country since 1900 is distinctly inferior to the type of immigrant previously received. In general the foreign-born in this study are probably of inferior intelligence in their own countries. These foreign-born do, however, adequately represent the foreigners now in this country between the ages of 20 and 30.

The column of this table headed "Army letter-grade rating," combines both Alpha ratings and Beta ratings, that is, ratings of both literates and illiterates in group examinations. The first horizontal line of the table shows the percentage of illiteracy and indicates the close relationship between per cent of literacy and average intelligence. The foreign-born and negroes were not penalized because of illiteracy, but rather had the advantage. There was a consensus of opinion among Army examiners that illiterate men of inferior intelligence tended to obtain higher ratings in the illiterate group examination (Beta) than they would have obtained in the literate group examination (Alpha) had they been able to read and write. Compared with the native whites, therefore, the foreign-born and negroes have probably higher ratings than they deserved. On the other hand, it is of course conceivable that illiteracy tends to inhibit the full expression of the innate or potential intelligence of a man who has not had the advantage of schooling and an ordinary social environment. In opposition to this, however, is the conviction of most examiners that

the negroes and foreign-born were adequately rated, and if anything, rated higher than their true intelligence warranted.

We come to the general conclusion, then, that the average intelligence of native whites is approximately 13 years, and that the average intelligence of foreign-born and negroes is approximately 10 years. It should be stated that there are striking differences in the mentality of the different foreign-born groups. The column of this table headed "foreign-born," is based chiefly upon southern Italians, Russians, and Russian-Poles, who constitute approximately 2,500 of the total 3,700. It is not feasible at this time to consider the intelligence of the foreign-born in relation to specific nationality. This was an important contribution in the study made by Lieut. Harlan quoted above. Similarly among the negroes there were striking differences between the northern and southern negroes. The southern negroes were decidedly inferior to the northern negroes. The southern negro had an average mental age of about 9 years as compared with the average mental age of about 11 for northern negroes, as indicated in the study of negroes referred to above.

#### THE AGE OF AVERAGE MENTAL ARREST

The conclusions drawn from the preceding argument indicate that the average intelligence level of native white adults is approximately 13 years. This implies that growth in general intelligence is complete at the life age of 13 years, but this is not a necessary corollary. Such a conclusion cannot be made until successive examinations over a period of years on large numbers of cases, indicate at what age intelligence actually does cease to develop. It is conceivable that while the average intelligence level of adults is 13 years, this development may not have been fully attained until perhaps considerably after the life age of 13 years. There is indeed some reason to believe in a decreasing rate of intelligence growth, so that complete intelligence development may not be attained until an indefinite age.

Some light is thrown on this problem by applying the Army Alpha test to juveniles. The writer has examined 514 children in the Franklin School, Trenton, N. J., with the Alpha group test. The median Alpha scores at each age are as follows:

Median Age	9 5	10 5	11 5	12 5	13 5	14 5	15 5
Median Score	26	37	61	81	85	80	88
No. Cases	29	38	63	96	139	75	22

These figures indicate that the median intelligence of children above 12 years does not significantly exceed the median of 12-year-old children. There is a slight superiority of 13 over 12, but after this there is a decrease. These children were examined in the eight grammar grades of a typical average public school. An analysis of the age and grade distribution indicates that the children are typically average school children. The children in the 15-year-old group might, however, be considered as slightly below average since they are slightly over age for the eighth grade.

A similar study has been made of 480 delinquent boys at the State Home for Boys at Jamesburg, N. J. The median scores at each age are as follows:

Median Age	9 5	10 5	11 5	12 5	13 5	14 5	15 5	16 5
Median Score	6	8	15	20	31	34	30	29
No. Cases	15	33	51	82	91	102	73	28

It will be observed that at each age these Alpha scores are markedly below the scores of the public school children of the same age. In fact, the average inferiority amounts to about 3 years. The point at issue, however, is that here again average development is complete at about 13 years, since the median scores of ages above 13 do not materially exceed those at 13, and in fact at some ages are below. This substantiates the result found in the public school and indicates that on the average, mental development is complete at about 13 years.

It is not possible to cite any satisfactory statistics for any long period of years on the successive mental ages of normal children of adolescent age. The writer is, however, conducting a study of approximately 250 feeble-minded children who have been re-tested over a period of at least four years each. It is too early to state final results, but as far as the study has progressed it is evident that the feeble-minded do not develop in intelligence after the life age of about 13 years. Contrary to previous beliefs, the age of final arrest is not a function of mental retardation, but is a fairly definite life age. Some feeble-minded of each grade continue to develop in general intelligence, even though only slightly, up to about 13 years of age.

From all of this evidence it appears that not only is 13 years the average intelligence age of adults, but the implication is very strong that the full level of intelligence has been reached at the life age of approximately 13 years. This is not to be understood, however, as meaning that the entire mental growth is attained at that age. Maturity and experience must

certainly continue to effect changes in mentality after the age of 13 years, but the intelligence *level*, on the average, remains fixed. This does not mean that no one develops in intelligence after 13 years of age, or that no one has a mental age above 13 years. On the contrary, 50 per cent of these groups have mental ages above 13 years. It is not possible to say at this time which of the 50 per cent continue to develop, nor to what mental age they develop, nor at what life age limits mental growth ceases. The only permissible conclusion from these data is that *on the average*, or for 50 per cent of presumably unselected cases, intelligence growth is practically complete at 13 years.

The writer wishes to emphasize that it would be fatal to both theory and practice to establish anything more than some new hypotheses on the data of this paper. Fifty per cent of these subjects do seem not to have developed intellectually after 13 years, but we cannot say much about the other 50 per cent. Repeated individual examinations on a large scale are now our most pressing need.

#### INTELLIGENCE AND FEEBLE-MINDEDNESS

There has been a tendency among clinical psychologists to lay increasing emphasis upon intelligence as a diagnostic symptom in determining feeble-mindedness. This emphasis is entirely proper but has been subject to a certain logical error. It was found by examining mental defectives in institutions that practically no feeble-minded "tested" higher than 13 years in the Binet-Simon scale. It was then concluded both by implication and by actual statement, that all who tested *under* 13 years were feeble-minded. The upper limit of feeble-mindedness was tacitly assumed as the lower limit of normality. Obviously this is the logical error of the converse. If all A is B, the only necessary consequence is, that *some* B is A. For example, if all negroes have mental ages below 15 years it does not follow that all persons with mental ages under 15 years are negroes.

From practical experience, some clinicians have developed the concept of borderlinity. They recognize that there is a certain mental age zone within which the intelligence level alone breaks down as a diagnostic instrument. Within the limits of this zone some persons may be feeble-minded, some doubtful and some normal. In this connection the important contribution of the Army examining lies in the demonstration that persons with mental ages as low as even 7 or 8 years may

be socially normal, and that others with mental ages as high as 13 or 14 years may be socially feeble-minded.

*The fundamental conception of feeble-mindedness, of course, is one of social competence. A feeble-minded person is not a person of a particular mental age, but is one who by reason of inferior intelligence is incapable of supporting himself independently of supervision in society, after he has reached the age of social responsibility or physical maturity.* The mental age limits which were developed by clinicians in the Army on the basis of practical experience to designate this social responsibility are somewhat as follows:

Diagnosis	Native White	Foreign-born	Colored
	Mental age	Mental age	Mental age
Invariably feeble-minded	under 8	under 7	under 7
Usually feeble-minded	8 0—8 9	7 0—7 9	7.0—7 9
Usually inferior normal	9 0—10 9	8 0—9 9	8 0—9 9
Usually average normal	11.0—13 9	10 0—11 9	10 0—11 9
Usually superior normal	above 14.0	above 12 0	above 12 0

In this table "invariably feeble-minded" means that persons of the intelligence level specified invariably proved to be feeble-minded when account was also taken of their social success, educability and general mental responsibility. "Usually feeble-minded," means that those persons within the mental age limits specified, usually, or in about 8 cases out of 10, proved to be feeble-minded when other factors are considered. In this group those who were not feeble-minded were ordinarily subnormal or borderline cases. "Usually inferior normal," means that in about 8 cases out of 10 the individual within the mental age limits specified proved to be normal on the basis of social responsibility, literacy, educability and general mental qualities. Those not found to be normal were ordinarily high-grade feeble-minded or borderline cases.

This grouping is not based on statistical or experimental study, but is an empirical classification developed from extensive experience. In the Army it was found impossible to use intelligence alone with any degree of certainty as a diagnostic method above intelligence level of about 8 years. Mental age was an invaluable diagnostic *aid*, however, and was perhaps the most important consideration next to a man's social history. In the Army it was found necessary to weigh social success very heavily in determining normality or feeble-mindedness, and in the mental examinations it was found important to take serious account of the quality of intelligence as well as the



level. Temperamental characteristics were also very important; prudence, forethought, judgment, reason and insight were opposed to mere verbal brightness.

It will be noted that this classification uses lower mental age standards for foreign-born and negroes than for native whites. This implies that the mental ages of foreign-born, negroes, and native whites are of somewhat unequal value in determining social fitness. The mental ages of the foreign-born and negroes seemed to be accurately measured, but due to some unknown psychological quality, the social value of mental age for foreign-born and negroes was somewhat greater than for the same age for native whites.

This empirical conclusion suggests an important problem for experimental psychology. If the prognostic value of mental ages is not constant for the different races, psychology should certainly aim to discover the reason. It seemed desirable in the Army, and still seems desirable, for practical social purposes, to judge individuals according to standards for their race and social class, but this leads to some confusion in the diagnoses obtained. We have come so much to depend upon mental age as an expression of social fitness, that it will be somewhat difficult to employ multiple standards for different social groups.

#### AVERAGE INTELLIGENCE AND THE I. Q.

It is now the practice to use 16 years as the basis of calculation for subjects whose life age is higher than 16. But if the implications here presented should be substantiated by further investigation, then it will become necessary to compute I. Q.'s. on a 13-year final age. This will make necessary a revision of previous work in which I. Q.'s. have been stated independently of age. Until the question of the average age of final mental development is settled, it should be urged upon all advocates of the I. Q. always to accompany I. Q.'s. with the actual ages of the individuals tested. This is important anyway, since I. Q.'s. are not directly comparable independent of life ages any more than diagnoses by race and class are comparable independently of the race and class standard. An I. Q. of 50 where mental age is 8, cannot be directly compared with an I. Q. of 50 where the mental age is 4.

It will be noted from the intelligence classification given above, that the I. Q. limits of feeble-mindedness are different from those advocated by Terman and his followers. According to this table, the "invariably feeble-minded" are found to have I. Q.'s. under 50 as opposed to the I. Q. of 70 advocated

by Terman, and the "usually feeble-minded" are found to have I. Qs. between 50 and 55, instead of between 70 and 75, as advocated by Terman. But, if the I. Q's. of the future come to be calculated on the basis of 13.5 years as the average adult intelligence, instead of 16 as now computed, then I. Q's. under 60 will "invariably" denote feeble-mindedness, and I. Q's. under 64 to 70 will "usually" denote feeble-mindedness. Thus we might retain the present I. Q. diagnostic limits advocated by Terman, but they would have to be calculated on a different basis.

#### SUMMARY

1 The average mental age of adults is found to be approximately 13 years instead of 16 as heretofore believed.

2. The growth of general intelligence is found to be practically complete on the average by 13 years of age and is not on the average thereafter exceeded. This applies strictly to the level of intelligence or degree of brightness as opposed to intelligence plus maturity, experience, and acquisitions.

3. These conclusions are induced by four separate investigations on totally different types of subjects and from different points of view, namely:

(a). The application of Alpha and Beta group intelligence tests to about 1,500,000 soldiers and recruits, where the average mental age is found to be about 13 years.

(b). The application of Alpha group intelligence tests to about 500 typical public school children, where the median scores of ages above 13 do not exceed the median for 13 years.

(c). The application of Alpha group intelligence tests to about 500 juvenile delinquent boys, who are found to be of inferior intelligence but whose level of intelligence is fully attained by 13 years, on the average.

(d). The repeated application of Binet intelligence tests to about 250 feeble-minded persons of wide ranges of life age and mental age, who individually may develop in intelligence up to a life age limit of 13 years and not thereafter.

4. The conclusions are induced not merely by the empirical data of each separate investigation, but particularly by the consistency of agreement obtained from such strikingly different methods of approach.

5. Striking differences are observed between the average levels of general intelligence of native whites, foreign-born, and negroes. Striking differences also are found for different social classes of native whites, different nationalities of foreign-born, and different geographical groups of negroes.

6. A logical fallacy is exposed in the application of mental age limits to the diagnosis of normality and feeble-mindedness. The conception of borderlinity in relation to mental age is much extended.

7. The calculation of intelligence quotients is found to be seriously disturbed by the uncertainty of the exact life age at which intelligence development is to be considered complete on the average.

8. The standardization of mental age scores for ages above 13 years by any method other than the percentile scores is not attempted, but is found to be impeded by the difficulty of obtaining fully representative unselected groups of subjects outside the grammar schools.

#### ADDENDUM

It is now possible to strengthen the above argument still further. Nearly 550 delinquent youths and young men between the ages of 16 and 29 inclusive, inmates of the New Jersey Reformatory, have recently been examined by Mr. J. W. Ellis, Assistant Psychologist to the N. J. Dept. of Institutions and Agencies, by means of the Army group test Alpha. The median Alpha scores at each age are as follows:

Median age	16	17	18	19	20	21	22	23	24	25	26	27	28	29	Total
Median score	59	62	56	58	57	43	28	69	38	39	60	98	22	38	56
No. cases	68	115	109	74	47	40	17	15	8	11	11	6	8	5	541

It is obvious from this table that there is no consistent increase in score with increase of age. During the range of years where there is a sufficiently large number of cases for the median to be dependable (16 to 21) there is no significant variation in score except for an unaccountable drop at year 21. The variations beyond year 21 may be accounted for on the basis of selection and the small number of cases. The fact that there is no consistent trend in these variations is, however, more significant than the variations themselves. The median score for the group represents a median mental age of approximately 14 years. The group is a selected group on the basis of delinquency yet the average intelligence score is nearly the same (slightly higher) than the average score of army recruits. Here again, however, we are not so much interested in the absolute score as the fact that there is no steady increase in score within increase in age. The intelligence levels above 16 are not superior to that of 16. It is probable, in the light of the public school and the Jamesburg Home

median scores that the 16-year median itself is perhaps not greater than it would have been had we had age groups extending down to 13 or 14 years, but this is conjectural.

This reformatory group supplies a fifth group and a new type of subject. The group covers the age-period between the public school group and the Army adult group. It fills the gap and gives a continuous range of ages from 6 to 31 years. (The scores for years 6, 7 and 8 years have been omitted in this paper.) The continuity is, of course, broken by the variations in types of subjects, but an adequate basis of preliminary argument is afforded in the actual results. The new data confirm the preceding argument that there is no increase in average general intelligence scores after a chronological age of presumably 13 or 14 years. Again we must insist that the scores of individuals range far above the 13-year level, with the presumption, however, that such scores represent superior deviations of the 13-year group and not age-increases as such. These superior scores also demonstrate that the 13-year level is not caused by limitations in the scale of tests itself, since individuals do score far beyond the median, thus proving the practical possibility of obtaining high scores if the capacity is present in the individual.