

A MENTAL AND PHYSICAL SURVEY OF A GROUP OF JUVENILE DELINQUENTS

WITH NOTES ON THE YERKES-BRIDGES POINT SCALE *

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At the request of the Boys' and Girls' Aid Society of San Francisco we undertook in September, 1916, a study of the boys placed in the society's care by the various juvenile courts of California. A few of these were committed as orphans or destitute, but the great majority were committed to detention because of truancy, incorrigibility or active crime.

Our study had for its primary purpose the disclosure of physical and mental defects, but was later extended, with the assistance of Miss Annette Rosenshine, to an investigation of the home conditions of the mentally normal or dull normal boys.

We have also taken this opportunity to compare the Yerkes-Bridges Point Scale with the Binet-Simon Scale (1911 Goddard revision) and to compare the physical measurements with the mental tests, following in some respects the recent work of Doll.

Our physical examinations were made according to the routine of the Stanford Children's Clinic, and included investigations of the skin, eyes, ears, teeth, tonsils, pharynx, thyroid gland, lungs, heart, abdomen, genitals and extremities; the tendon reflexes, and the posture. In addition, vision was tested by the Snellen card at 20 feet without glasses, and a rough estimate of hearing was obtained by the watch test. The Wassermann test was applied in sixty cases, including about half of those in which enlarged epitrochlear glands were found, but owing to circumstances not under our control, could not be carried out in the remainder. Measurements of standing height, chest circumference, head circumference, and of the grip of each hand (dynamometer) were made. It is a matter of regret that the inconvenience of transporting our spirometer to and from the home of the society made it impossible to obtain measurements of vital capacity.

GENERAL PHYSICAL ABNORMALITIES OF THE GROUP AS A WHOLE

Taken as a whole, the 110 boys first examined were somewhat below the normal in height, with a percentile¹ of 44, as compared with the normal average of 50. The percentile for weight, however, was

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* From the Department of Pediatrics, Stanford University Medical School.

1. All percentiles were calculated from the Smedley tables, in which the group average is 50, with a minimum normal of 0 and a maximum normal of 100.

57 and the percentiles for right and left grip were 55 and 59, respectively, all of which are well above the normal. The superiority of the left grip is noticeable. Of the boys, 18.4 per cent. showed vision below 20/30 for the right and 25.2 per cent. for the left eye. Strabismus—convergent except in one instance—was found in 10 per cent. Defective hearing occurred in 15.4 per cent. The teeth were decayed in 53 per cent., irregular or maloccluded in 7.3 per cent. and merely dirty in 11.2 per cent. The tonsils were enlarged in 36.4 per cent. and had been removed in 11.7 per cent. Enlargement of the thyroid gland was not encountered. The anterior cervical glands were palpable in 61 per cent., the posterior cervical in 50 per cent., the inguinal in 74.5 per cent., the axillary in 50 per cent. and the epitrochlear in 19.1 per cent. Wassermann tests were made in ten of the twenty-one cases in which the epitrochlears were palpable without a single positive reaction being obtained. In the one case, out of the sixty tested, in which a positive reaction did occur, the epitrochlears were not palpable. Our respect for this time-honored sign of syphilis has been lessened. Abnormalities of the chest, noted as "flat," "narrow," "pigeon-breasted," occurred in 10 per cent. Two cases of chronic endocarditis were found. One inguinal hernia was discovered. The prepuce was elongated or adherent in 21.7 per cent., and had been circumcized in 20.9 per cent. Four instances of unilateral cryptorchidism were found. Pubic hair was present in 54.5 per cent. Disease of the skin—acne, furunculosis or impetigo—occurred in 10.9 per cent. The knee jerks were unusually lively, without other signs of spasticity, in 6.4 per cent. Postural defects—round shoulders, wing scapulae, lateral curvature of the spine—were noted in 22.7 per cent.

Taken as a whole, and leaving aside for future consideration the various measurements and certain special features, the physical defects are those common to any group of children whose hygiene has been long neglected.

MENTAL EXAMINATION

At the time when the present study was begun, the children's clinic was considering the merits of the Yerkes-Bridges² Point Scale, and for purposes of comparison a majority of the boys, ninety-eight in all, were examined both by the Binet-Simon Scale (1911 Goodard revision) which had been used hitherto in the clinic, and by the Yerkes-Bridges Scale.

The Yerkes-Bridges Point Scale was devised by Robert M. Yerkes, assisted by James W. Bridges, following a suggestion by the late Dr. E. B. Huey. A complete description of it was published in 1915 by Yerkes, Bridges and Hardwick.² The purpose of the authors was to construct a new scale to

2. Yerkes, R. M., Bridges, J. W., and Hardwick, R.: A Point Scale for Measuring Mental Ability. Baltimore, Warwick and York, 1915.

supplant the Binet-Simon Scale and its various revisions, which had been found by many workers to be unsatisfactory. They included, however, a considerable number of the Binet tests in their own method. The difference between the two scales will be best indicated by a brief description of each.

The Binet Scale, as well as its revisions, presents a series of tests arranged in order of presumably increasing difficulty, and divided in groups of four or five, each group corresponding with a year of "mental age." The mental age of the subject of the examination is that corresponding to the highest complete group of tests that he passes, plus the figure for the number of tests, expressed as fifths of a year, that he passes in the higher groups. Thus, if a child passes all the tests up to and including Group X, three tests in Group XI, and one test in Group XII, his mental age is stated as $10\frac{1}{5}$ ($10 + \frac{3}{5} + \frac{1}{5}$). In this scheme it is theoretically assumed that (1) each group of tests examines satisfactorily for the age the various mental functions; (2) that every "normal" child without regard to environment or training can answer all the questions assigned to his physical age; (3) that inability to answer perfectly any question or test implies complete failure in that test; (4) that all tests are of mathematically equal weight in evaluating intellectual capacity. As a matter of fact—and this is an important objection to the Binet system—every examiner is compelled to modify to some extent the result of every examination by taking into account certain extraneous factors, such as language difficulty, unfavorable environment, and so on. The personal equation, therefore, enters into all Binet testing, and to an undesirable extent.

The Point Scale presents a series of tests, arranged roughly (for the sake of convenience only) in order of difficulty but not divided into age groups, which are designed to test the various mental functions, such as auditory memory, motor coordination, ideation, kinesthetic discrimination, logical judgment. To each of these tests a certain value, expressed in points, is attached. The sum of these values, that is, the score attainable by completion of all tests, is 100. The score attained by the individual examined is the sum of the points assigned to the tests in which he is successful. Part credit is given for partial completion of the tests, thus abandoning the all-or-none principle of the Binet system. The final score is then compared with the norm. This norm is properly made a variable quantity, allowance being given for favoring or unfavorable circumstances of environment and training, factors which practically all investigators recognize as influencing the capacity of individuals to pass mental examinations. The "setting" of the norm, however, can be determined by a direct comparison of the scores of other individuals belonging to the same group and need not be left to the personal judgment of the examiner. The Point Scale offers both an absolute scale of measurement—in relation to an ideal 100—and a relative scale—in relation to the norm for the particular social or educational group to which the individual belongs. The improvement over the older scale is thus in the direction both of objectivity and of flexibility. As the authors point out, the results of examinations at the hands of different examiners are directly comparable, and at the same time the norms can be constantly corrected by experience and comparison.

The discrepancies between the two methods of examination, shown graphically in Chart 1, are considerable and of rather serious significance. In adopting norms for the Point Scale it must be emphasized that we do this only for comparison with the Binet Scale, and that, to our mind, norm-comparison is not the chief purpose of the Point Scale, which has its greatest value rather in estimating total mental capacity. The point scale, as has been pointed out by its originators, has the advantage of being self-perfecting and is not committed to

rigid norms, so that we have taken the liberty of modifying the original figures of Yerkes and Bridges by comparison with those of Haines,³ derived from a study of individuals belonging to about the same social stratum as the one with which we were dealing, and with data of our own. The norms for ages above 15 cannot be regarded as fully established: those we have adopted are based partly on the Yerkes-Bridges figures and partly on data of our own, and must be taken as only approximations, with an error of perhaps 3 per cent.

We suggest that the originators of the point scale are rather too conservative in stating that the scale is not of great value above age 16. We have a conception, which may or may not be correct, that the scale tests with considerable completeness and accuracy what we may call basic intelligence. By this we mean the broad foundation of

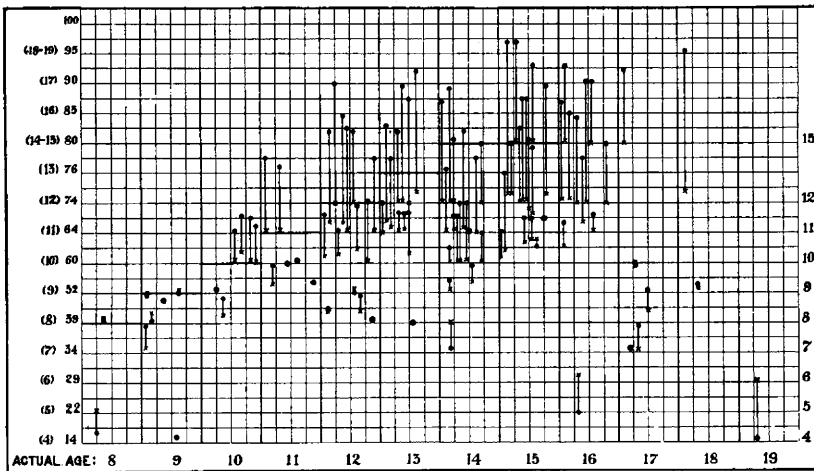


Chart 1.—Comparison of the Yerkes-Bridges Point Scale score and the Binet age of ninety-eight delinquent boys. The Point Scale score and Binet age of each boy are connected by a vertical line. Point Scale score = ●; Binet age = ×.

mental endowment which every normal person must possess before he can branch out into the more highly specialized, so-called higher intellectual functions of adult life. Above this basic level, which is common to all normal individuals, mental growth is along the line of special acquirement and follows closely educational direction. Therefore we feel that so-called adult tests are rather impracticable except along special lines, but that basic intelligence can be tested at any age and is of value at any age.

Our Binet tests — Goddard's 1911 revision with tests for age 15 and for the adult — were practically useless above age 12, and were

3. Haines, T. H.: *Mental Examination of Delinquent Boys and Girls*. Illinois Med. Jour., 1915, 28, 283.

also very defective for age 11. This is in accordance with the experience of most investigators. It is plain from Chart 1 that a Binet age of 12, or 12 and a fraction, may represent widely varying degrees of intelligence, as measured by the Point Scale. That the Goddard tests for age 15 and for the adult fail to remedy the fault is also clear.

In Chart 2 we have compared all our scores (calculated as intelligence quotients⁴) by the two scales, arranging them in an ascending order of the Point Scale intelligence quotient. Up to 0.90 the discrepancies nearly balance, the Binet quotient being higher in 17, and the Point Scale higher in 19. At 0.65 and below (P. S. I. Q.) (that is, in the unquestionably defective group) nine Point Scale quotients are lower, and only two Binet quotients are lower, two being the same. Above 0.90 (P. S.) *only one* Binet quotient was higher (by 0.03).

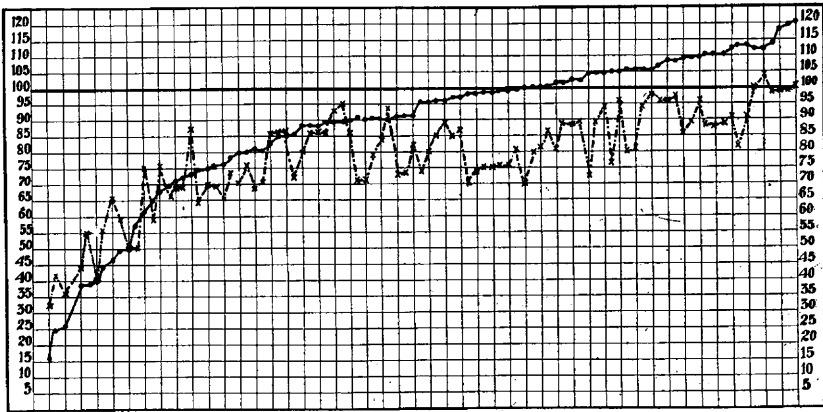


Chart 2.—Comparison of all Point Scale and Binet intelligence quotients arranged in ascending order of Point Scale quotients. In this and following charts ● = Point Scale intelligence quotients; × = Binet Scale intelligence quotient.

Considering a Point Scale quotient of 1.10 or more as evidence of mental superiority, we find in this group that the Binet quotient gave no indication whatever of such superiority; three out of five cases with the highest P. S. quotients were actually below 1.00 by the Binet, and only one was above 1.00.

Charts 3 and 4 are arranged to show the degree of "overlapping" between groups by the two scales. Kohs⁵ has already drawn attention to this phenomenon. We have provisionally adopted a maximum of 0.95 for the dull normals, instead of 0.90 as generally used for the

4. The intelligence quotient equals the mental age divided by the actual, or chronological, age.

5. Kohs, S. C.: The Borderlines of Mental Deficiency. *Jour. Psycho-Asthenics*, 1916, 20, 63.

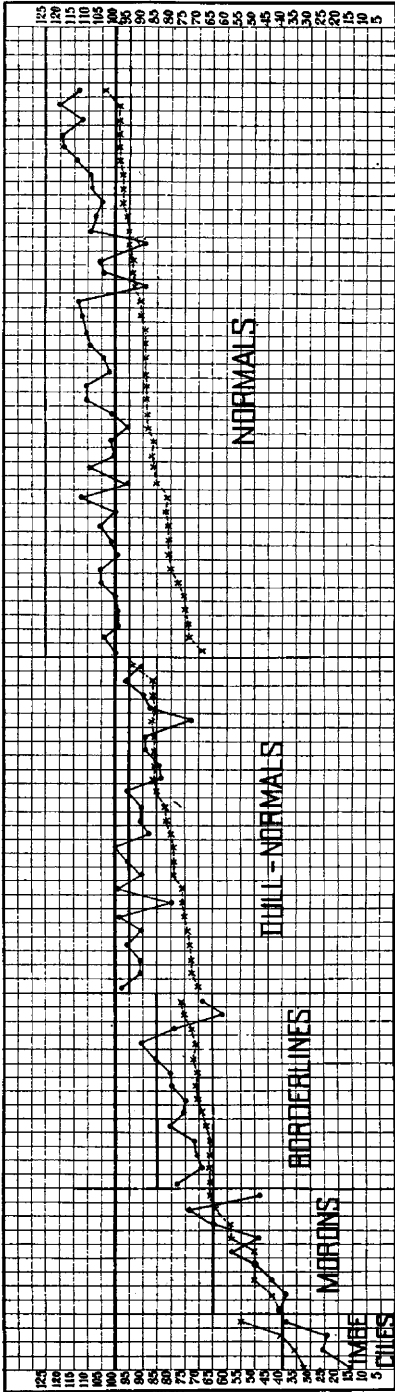


Chart 3.—Comparison of Binet Scale and Point Scale quotients arranged on the basis of Binet quotient.

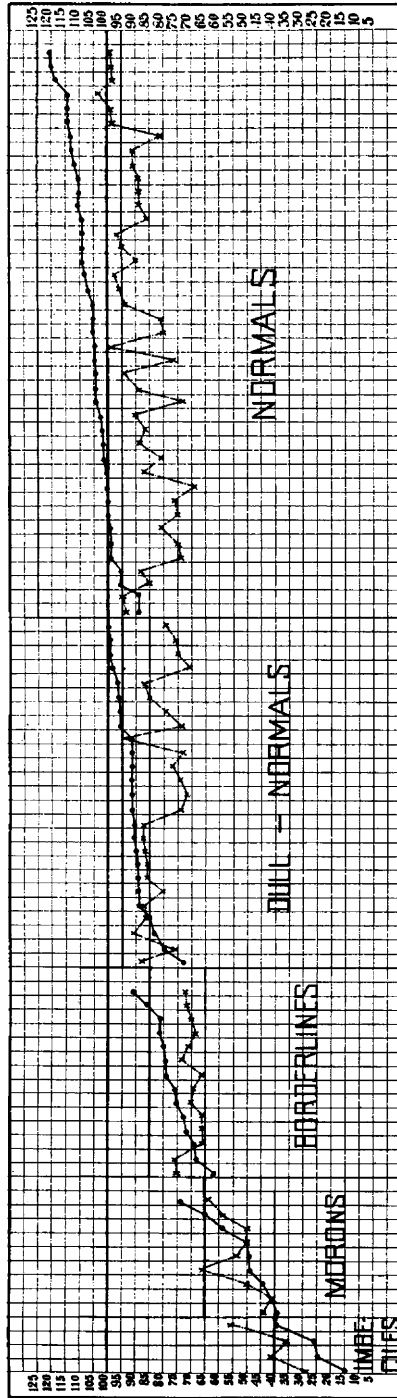


Chart 4.—Comparison of Binet Scale intelligence quotients arranged on the basis of Point Scale quotient.

Binet Scale. Table 1 shows the amount of "overlapping." The significant feature of this table is that by the Binet Scale, forty-two boys, who, we were satisfied, belonged to the normal group, had intelligence quotients below the group in which they were placed, whereas by the Point Scale eleven ranked above and only five below. Stated in another way, by the Binet tests, we should have had to place thirteen boys in the borderline group instead of in the dull normal group, whereas by the Point Scale only three such changes would have been necessary, if the results were to be rigidly interpreted by the intelligence quotient.

Let us emphasize again that the intelligence quotient, being based on group average norms in neglect of individual variations, involves a good deal of unavoidable error and to our mind should be used only for purposes of group study.

TABLE 1.—SHOWING COMPARATIVE AMOUNTS OF OVERLAPPING
BY THE TWO SCALES

Cases	Binet Scale		Point Scale	
	Above	Below	Above	Below
Imbeciles, 15-40.....	2	0	0	0
Morons, 40-65.....	1	0	1	1
Borderlines, 65-85.....	0	0	2	1
Dull Normals, 85-95.....	0	13	8	8
Normals, 95.....	..	29	..	2
Total.....	3	42	11	7

Now it must be clear that one or the other of the scales is seriously faulty. That the Binet scale is at fault is suggested by the character of the discrepancies. In the first place, in unquestionably defective children the Point Scale gives a lower rating. Second, the discrepancies are least at the ages 6 to 10, when the Binet Scale has already been recognized as most accurate. Third, in the higher ages, when the Binet Scale has been found to be unsatisfactory, Point scores are obtained that correspond with normal expectation and in normal children increase with age (exception, at ages 14 to 15, when the score is stationary). Fourth, indications of exceptional intelligence are obtained by the Point Scale and not by the Binet Scale, which have been corroborated in a few of our cases by strong collateral evidence.

The Point Scale, moreover, appeals strongly to those who dislike the indirection of the Binet plan of scoring. To us the latter seems perfectly analogous to the recording of height, for instance, in terms of age. Besides being scientifically objectionable because indirect, it is also essentially inaccurate because it fails to take into account

the considerable variations of intelligence existing among normal individuals. Certainly but a small percentage of the many examinations that we have made during the last four years by the Binet Scale have shown an exact correspondence between mental "age" and chronological age.⁶ The Point Scale score, on the other hand, is a direct statement of measurement and approaches the ideal of recording data in absolute rather than in relative terms.

We cannot leave the subject without mentioning a point which experience has brought frequently to our attention. This is the caution which is necessary in comparing individual scores with group average norms, as in the intelligence quotient, for the benefit of parents, guardians or teachers. We feel that in so doing the normal variations are frequently lost to sight and the stigma of retardation or pathologic deficiency wrongly fastened on the subject. It must be remembered that while the examiner can make allowances for normal variation, the laity will not do so. The figures for mental age are too readily compared with chronological age and insignificant degrees of variation require explanation which often serves only to cast suspicion still further. That this is by no means an unimportant or merely academic point is indicated by the strong public prejudice already created in many quarters against public school mental examinations. This is a question which must be promptly faced if mental examinations are to be generally introduced in American schools. The noncommittal (and more accurate) Point score has the inherent advantage that it can always be compared with *minimum* normal figures for age, instead of with a group average norm.

A word as to our method of deciding on the final diagnosis: We have not depended entirely on the score attained by either scale, but in a few instances have had to make allowance for various retarding environmental influences, such as deafness, faulty vision, and especially the effects of isolation and imperfect adaptation to surroundings consequent to foreign birth, foreign parentage and imperfect use of English. For these reasons, a few individuals have been provisionally placed in a category above that for which a strict interpretation of the tests would qualify them. In a few instances, also, we have modified the Point Scale diagnosis by a *favorable* discrepancy in the Binet Scale, but this has been necessary in but few cases.

PHYSICAL FINDINGS COMPARED WITH MENTAL STATUS

In Tables 2 and 3 we have arranged the more significant physical findings in columns parallel with our mental examinations. For this purpose we have taken ninety-three cases selected because of completeness, but on no other basis of exclusion.

6. Yerkes, Bridges and Hardwick (p. 40) (Footnote 2) by a reconstruction of Goddard's data have brought out the same point very forcibly.

TABLE 2.—SUMMARY OF PHYSICAL—

No.	Offense	Actual Age		Height		Height Per- centile	Weight		Weight Per- centile	Grip		Grip Per- centile		Head		
		Yrs.	Mos.	In.	Mm.		Lbs.	Kg.		Right Kg.	Left Kg.	Right	Left	Girth, Cm.	Ex- cess, Cm.	Defi- cit, Cm.
4	Stealing	17	1	66¼	1,680	43	188¼	63.0	66	41	42	30	47	55.5	....	....
5	Stealing	12	3	61½	1,562	95	112	50.8	94	39	38	102	110	.....	....	....
6	Incorrigible	15	4	66¼	1,680	79	188	62.5	85	46	46	87	91	56.9	2.2	....
9	Dependent	15	11	64	1,625	57	183¼	60.4	88	39	41	65	83	58.5	3.5	....
10	Dependent	10	9	55½	1,400	86	70½	31.8	74	19	22	70	93	53.5	0.7	....
14	Stealing	16	2	60¾	1,545	10	105½	47.8	17	19	25	02	09	53.5	....	1.6
15	Incorrigible	11	9	52¾	1,337	27	69	31.3	41	20	22	60	85	51.5	....	1.6
19	Stealing	15	5	67¼	1,705	87	142½	64.5	91	38	32½	60	51	.....	....	....
20	Incorrigible	16	3	64	1,630	34	181½	59.6	73	36	34	30	30	54	....	1.2
26	Dependent	10	..	54¾	1,395	84	79¼	35.8	91	16	21	30	92	52.2	....	0.7
27	Stealing	13	7	55¾	1,410	14	78½	35.5	22	23½	22½	43	48	53.6	....	....
28	Truancy	15	6	63¾	1,622	55	122¼	55.5	74	42	35	77	60	.....	....	....
29	Stealing	11	5	56¼	1,405	70	72½	32.8	58	22	15	75	20	51	....	2.0
35	Stealing	16	3	62¾	1,595	20	111½	50.5	29	....	....	....	....	.....	....	....
37	Truancy	12	4	53¾	1,362	20	83¾	37.9	71	24	22	70	70	54.3	1.0	....
38	Dependent	12	5	59½	1,512	90	97½	44.2	91	29	23	91	75	52.5	....	0.8
39	Dependent	12	8	58¼	1,480	80	96¼	43.8	91	31	27	93	91	55	1.7	....
40	Dependent	13	7	61¾	1,575	85	89¼	40.4	58	26	24	60	60	53.7	....	....
41	Stealing	10	6	51¾	1,312	36	70	31.7	73	20¼	19½	83	83	52.8	....	....
42	Burglary	16	8	60	1,525	32	96	43.5	08	35	33	25	27	52.3	....	3.1
43	Truancy	12	5	55	1,400	39	92	41.7	86	25	28	75	95	54	0.7	....
47	Dependent	13	..	54	1,378	08	74½	23.7	13	27	32	65	91	53.3	....	....
57	Incorrigible	15	7	63¾	1,625	57	119	53.9	68	30	31	30	45	54.5	....	0.3
59	Stealing	14	..	57¾	1,470	21	83	37.6	19	25	26	35	50	53.3	....	0.6
62	Incorrigible	14	8	61	1,552	51	97½	44.2	50	30	29	60	65	53	....	1.3
63	Burglary	15	7	62	1,575	35	134¼	61.0	88	41	40	73	81	54.3	....	0.4
67	Incorrigible	14	2	61	1,552	51	112½	51.0	80	42	39	91	92	55	1.0	....
69	Stealing	15	4	61¾	1,555	27	107	48.5	41	39	44	65	88	51.3	....	3.4
72	Truancy	8	7	47¾	1,215	39	52¼	23.7	37	16	15	77	77	49.5	....	2.7
76	Truancy	10	7	51½	1,310	34	75¾	34.3	38	20	18	80	70	52.3	....	....
79	Neglect	13	1	62¼	1,580	85	93¾	42.4	67	26	25	60	65	53.9	0.5	....
82	Truancy	14	3	57¼	1,455	16	92	41.7	38	38	34	86	85	55	0.9	....
83	Truancy	14	..	62¼	1,582	66	104	47.2	66	35	31	80	75	52	....	1.9
87	Burglary	15	3	70¼	1,785	96	151¼	68.2	92	56	53	94	95	56	1.4	....
91	Stealing	12	..	55¾	1,420	50	73	33.1	32	24	23	70	75	51.5	....	1.7
92	Stealing	16	4	67	1,705	70	125¼	56.8	57	34	38	20	50	53	....	2.2
97	Incorrigible	9	8	53½	1,360	87	62½	28.3	62	21	21	91	93	50.6	....	2.0
106	Stealing	13	9	58¾	1,495	55	88¾	40.2	57	30	24	80	60	54	0.3	....
107	Stealing	13	..	59¾	1,520	67	102	46.2	84	39	36	92	93	52	....	1.4
108	Stealing	10	8	51¼	1,315	28	71¼	32.5	80	22	17	90	60	49.5	....	3.3
110	Incorrigible	11	2	55¾	1,415	75	83¾	38.0	90	24	23	85	90	51.5	....	1.4

Normals

—AND MENTAL FINDINGS

Vision		Strabismus	Defective Hearing	Enlarged Tonsils	Teeth	Lymph Nodes		Prepuce	Testes	Skin Disease	Postural Defects	Point Scale Score	Binet Age	Normal = 100		Physical Percentile (Normal = 50)
O. D.	O. S.					Cervical	Epi-trochlear							Binet I. Q.	Point Sc. I. Q.	
20/20	20/20	0	0	+	0	+	0	0	0	Fur.	0	96	15	88	100	26
20/20	20/20	0	0	0	0	0	0	0	0	0	0	88	12	98	119	98
20/20	20/20	0	0	0	0	0	0	R.	0	Acne	0	97	15.2	99	118	86
.....	.....	0	0	+	0	+	0	0	0	0	0	89	12.6	79	105	78
20/20	20/20	0	0	+	0	0	0	R.	0	Im.	0	67	10	93	106	81
20/20	20/20	0	0	0	0	+	0	0	0	0	0	93	15.4	95	108	10
20/20	20/20	0	0	0	D.	+++	0	Lg.	0	0	0	76	11.4	97	106	53
.....	.....	0	0	+	0	+	0	0	0	Im.	0	87	12.4	81	106	72
20/20	20/20	0	0	0	D.	0	0	0	0	0	0	85	12.4	71	99	42
20/20	20/20	0	0	0	D.	+	L. +	0	0	0	W.S.	68	10.4	96	118	74
20/20	20/20	0	0	+	D.E.	++	0	Lg.	0	0	W.S.	89	12.2	90	112	32
20/20	20/20	0	0	+	0	+	+	0	0	0	0	87	12.4	72	106	67
20/20	20/20	0	+	0	D.	++	0	Lg.	0	0	L.C.	79	11.2	98	114	56
20/20	20/20	0	0	0	D.	0	0	0	0	0	0	84	12	74	98	25
.....	.....	0	0	0	D.	+	0	Lg.	0	0	0	83	11	90	111	58
20/40	20/100	0	0	0	D.	0	0	0	0	Im.	0	72	10.6	86	96	37
.....	.....	0	0	0	0	0	0	0	0	0	0	78	11.4	89	104	39
20/20	20/20	0	0	0	D.E.	0	++	0	0	0	0	87	12	88	111	66
20/20	20/20	0	0	0	D.	++	0	R.	0	0	0	65	10.4	100	105	69
20/20	20/30	+C.	0	0	D.	0	0	0	0	Warts	W.S.	91	15	90	103	23
20/20	20/30	+C.	0	0	0	0	0	Lg.	0	0	0	82	12	97	109	74
20/100	20/50	0	0	0	0	++	0	R.	0	0	0	79	12.2	94	104	44
.....	.....	0	0	0	0	0	0	0	0	0	0	81	11.8	76	98	50
20/20	20/20	0	0	0	D.	0	0	Lg.	0	0	0	89	12.4	89	111	31
20/20	20/30	0	0	0	D.Ir.	++	0	R.	0	0	W.S.	80	12	82	100	57
20/20	20/20	0	0	0	0	0	0	R.	0	0	0	93	15	96	107	69
20/30	20/70	0	0	R.	0	+	0	R.	0	0	0	81	12.2	86	101	79
20/20	20/20	0	0	R.	0	++	0	0	0	0	0	80	12.4	87	99	55
20/30	20/30	0	0	R.	D.	0	0	R.	0	0	0	40	8.2	95	89	58
20/20	20/80	0	0	0	D.	0	0	0	0	0	0	70	10.6	100	113	68
20/30	20/30	0	0	++	D.Ir.	+	L. +	R.	0	0	0	78	11.4	89	103	84
20/20	20/20	0	0	0	0	+	0	0	0	0	0	82	11.6	81	102	56
20/20	20/20	+C.	0	++	D.Ir.	+	0	0	0	0	0	87	12.4	89	109	72
20/20	20/20	0	0	0	0	+	0	0	0	Fur.	St.	97	12.6	82	113	94
20/20	20/20	0	0	+	D.	+	0	0	0	0	0	71	10.6	88	96	57
20/20	20/20	0	0	0	0	0	0	0	0	0	0	91	12	74	104	49
20/40	20/50	0	0	0	D.	+	+	Lg.	0	0	0	51	9	98	89	34
20/20	20/20	0	0	R.	0	0	0	0	0	0	0	89	12.6	91	113	63
.....	.....	0	0	0	0	+	0	0	0	0	W.S.	83	11.8	91	109	84
.....	.....	0	0	0	0	+	+	0	0	0	0	88	10.4	97	103	65
20/20	20/20	0	0	+	D.	++	0	Lg.	0	0	W.S.	80	11.2	100	121	86

TABLE 2.—SUMMARY OF PHYSICAL—

	No.	Offense	Actual Age		Height		Height Per- centile	Weight		Weight Per- centile	Grip		Grip Per- centile		Head		
			Yrs.	Mos.	In.	Mm.		Lbs.	Kg.		Right Kg.	Left Kg.	Right	Left	Grth, Cm.	Ex- cess, Cm.	Def- ct., Cm.
Dull Normals:	1	Stealing	14	7	66	1,680	91	133¼	60.4	94	43	30½	92	73	56.5	2.2	....
	2	Stealing	14	5	56	1,425	09	87½	39.5	27	25	22	35	25	50.3	....	3.8
	8	Dependent	12	7	54¾	1,395	36	71¾	32.5	27	23	19½	60	45	50	....	3.3
	16	Stealing	16	..	56	1,425	00	89¾	40.4	05	31	24	13	08	50	....	5.0
	17	Burglary	15	5	62½	1,580	37	114½	51.8	58	32½	36	41	63	53.3	....	1.4
	18	Incorrigible	10	7	54¾	1,392	83	80¾	36.6	91	25	24	98	96	52.5	....	0.3
	24	Truancy	11	4	57½	1,462	91	102¾	46.6	96	22	21	75	80	53.7	0.7	....
	25	Dependent	9	..	53¼	1,355	86	70¼	31.8	90	11	16	09	70	52.7	0.3	....
	33	Dependent	9	1	56¾	1,430	95	81¾	36.7	97	22	18	92	83	54	1.0	....
	36	Truancy	11	8	56¾	1,427	81	75¾	34.3	70	23½	21	33	80	50.2	....	2.9
	46	Truancy	11	8	56¾	1,437	84	70¾	32.5	54	19	20	50	70	52.5	....	0.6
	48	Dependent	10	..	54	1,372	76	74½	33.8	87	19	19	70	80	50.9	....	1.8
	54	Truancy	14	3	60¼	1,532	45	111½	50.5	78	40	35	90	87	56.9	2.9	....
	55	Dependent	14	3	60¾	1,542	47	106	48.0	70	37	34	84	85	55	1.0	....
	56	Truancy	14	2	57	1,450	14	83¼	37.7	19	23	24	23	35	52	....	2.0
	71	Stealing	15	8	63¾	1,615	50	129¾	58.8	84	44	43	82	87	56.3	1.5	....
	75	Dependent	16	8	63¾	1,620	31	127¼	57.7	63	39	38	40	50	55.5	....	....
	77	Stealing	14	..	57¾	1,452	15	88	39.9	29	30	28	60	60	52.7	....	1.2
	80	Truancy	15	1	62¾	1,595	42	115¾	52.4	61	35	30	50	40	54	....	0.5
	84	Truancy	13	4	54¾	1,385	08	77¾	35.2	21	23	21	40	40	54	0.5	....
90	Stealing	13	..	57¾	1,465	41	88¾	40.2	57	24	23	45	50	53.3	....	....
103	Stealing	13	8	62¼	1,585	86	128	58.0	94	28	31	70	90	53.5	....	....
105	Dependent	13	6	61¾	1,565	82	109¼	49.5	90	34	39	90	94	51.3	....	2.3	
109	Incorrigible	12	3	54¼	1,385	32	87	39.4	76	21	17	40	20	52.3	....	0.9	

—AND MENTAL FINDINGS—(Continued)

Vision		Strabismus	Defective Hearing	Enlarged Tonsils	Teeth	Lymph Nodes		Prepuce	Testes	Skin Disease	Postural Defects	Point Scale Score	Binet Age	Normal = 100		Physical Percentile (Normal = 50)
O. D.	O. S.					Cervical	Epi-trochlear							Binet I. Q.	Point Sc. I. Q.	
20/20	20/20	0	+	R.	D.	+	0	R.	0	0	0	78	11	75	98	88
20/20	20/20	0	0	0	D.	+	+	0	0	0	0	64	11	76	80	24
20/20	20/20	0	0	0	D.	+	0	Lg.	0	0	0	78	10	79	97	42
20/30	20/70	0	+	+	D.M.	0	0	R.	0	0	W.S.	84	12.2	76	99	07
20/30	20/200	+C.	0	R.	0	0	+	0	0	0	.....	82	12.2	79	100	50
20/20	20/20	0	0	0	0	0	0	R.	Cry.	0	W.S.	53	9.2	87	85	91
20/30	20/40	0	0	0	0	+	0	0	Cry.	0	0	59	9.8	86	88	86
20/30	20/20	0	0	+	D.	+	0	Lg.	0	0	0	38	7.8	87	73	64
20/30	20/30	+C.	0	+	D.	++	L. +	Lg.	0	0	0	48	8.6	95	91	92
20/30	20/30	0	0	0	D.	+	0	0	0	0	0	59	10	85	83	79
.....	.....	0	+	R.	D.	++	L. +	R.	0	0	W.S. L.C.	63	10.6	91	88	65
20/20	20/30	+C.	0	0	D.	+	+	0	0	0	0	54	9.4	94	90	78
20/20	20/20	0	0	0	0	++	+	R.	0	0	0	74	10.4	73	92	75
20/20	20/30	0	0	++	D.	++	+	0	0	0	0	74	10.6	74	92	72
20/20	20/20	0	0	+	0	++	0	Lg.	0	0	0	70	11.2	79	88	28
20/200	20/20	0	0	0	D.	+	0	0	0	0	0	80	11.4	78	96	76
20/20	20/30	0	+	+	D.	+	0	R.	0	0	0	80	12	72	91	46
20/30	20/30	0	0	+	0	+	++	0	0	0	W.S.	77	11	79	96	41
.....	.....	0	0	+	D.	++	0	0	0	0	0	79	10.6	70	98	48
20/20	20/20	0	0	+	D.	+	0	Lg.	0	0	0	71	11	83	92	27
20/20	20/20	0	0	0	0	0	0	R.	0	0	0	74	11	85	97	48
20/20	20/30	0	+	R.	Ir.	++	0	0	0	0	0	72	11.4	83	91	85
20/20	20/20	0	0	0	0	+	0	0	0	0	0	71	10.8	80	91	89
20/20	20/30	0	+	+	0	++	0	R.	0	0	0	66	10.6	86	89	42

TABLE 2.—SUMMARY OF PHYSICAL—

	No.	Offense	Actual Age		Height		Height Per-centile	Weight		Weight Per-centile	Grip		Grip Per-centile		Head		
			Yrs.	Mos.	In.	Mm.		Lbs.	Kg.		Right Kg.	Left Kg.	Right	Left	Girth, Cm.	Ex-cess, Cm.	Defi-cit, Cm.
Border- lines	11	Stealing	15	10	63%	1,625	57	119%	54.1	69	31	30	35	40	55	....	....
	12	Stealing	14	2	58%	1,477	24	96%	43.8	49	31	35	65	88	55	1.0	....
	13	Dependent	12	..	55%	1,420	49	76%	34.8	48	20	18	30	30	50	....	3.2
	23	Truancy	15	..	60%	1,530	18	105%	47.9	35	26	22	10	09	52	....	2.5
	31	Burglary	15	9	60½%	1,540	21	119	53.9	68	32	29	40	35	.....	....	....
	34	Dependent	15	9	60%	1,535	19	122%	55.6	78	37	32	57	50	53	....	1.9
	49	Stealing	16	4	65	1,652	41	133	60.3	75	....	....	....	....	55.7	0.5	....
	50	Dependent	14	7	59½%	1,512	47	110	49.8	76	32	26	70	50	54.5	0.3	....
	58	Stealing	12	5	49%	1,250	0	60%	27.2	06	15	15	07	10	54	0.7	....
	70	Burglary	15	8	60%	1,550	25	117½%	53.2	65	37	32	57	50	54	....	0.8
	74	Burglary	14	3	59%	1,492	30	92½%	41.8	39	30	28	60	60	56	....	2.0
	85	Incorrigible	14	2	53½%	1,360	05	72%	32.7	07	23	23	23	30	50	....	1.1
	86	Incorrigible	10	..	49%	1,252	09	64%	29.1	46	21	19	85	80	51	....	1.7
94	Stealing	16	4	63%	1,610	26	117	53.0	39	41	35	50	35	53	....	2.2	
95	Incorrigible	14	8	66%	1,685	92	135½%	61.4	95	37	28	84	60	53	....	1.4	
Morons	7	Stealing	18	9	61%	1,575	-7	106%	48.4	05	36	23	00	-8	56	0.3	....
	32	Stealing	17	..	65½%	1,665	32	124	56.2	36	42	41	36	43	53	....	2.6
	45	Incorrigible	17	6	63%	1,620	14	125½%	56.8	38	24	29	03	08	51.5	....	4.1
	51	Incorrigible	12	10	53%	1,350	16	74%	33.8	42	22	20	50	50	52	....	1.3
	52	Incorrigible	14	3	55	1,400	07	82½%	37.4	18	21	19	10	10	50.5	....	3.5
	60	Truancy	17	2	62½%	1,590	09	111	50.3	13	35	34	10	17	54	....	1.5
	73	Incorrigible	17	3	60%	1,550	08	108½%	49.2	10	36	31	11	09	53	....	2.5
	93	Truancy	16	..	61%	1,560	12	126	57.2	59	38	36	37	40	57	....	2.0
	96	Truancy	13	9	52%	1,332	08	71%	32.3	08	42	23	93	50	50.1	....	3.6
Imbe- ciles	3	Truancy	19	4	56%	1,445	-2	98½%	42.3	-9	24	23	-26	-15	.....	....	....
	21	Incorrigible	16	3	65	1,652	41	143	64.8	87	41	44	50	77	55.2	....	....
	53	Incorrigible	8	5	46½%	1,172	15	51%	23.4	33	10	16	10	36	50	....	2.2
	101	Incorrigible	10	7	52%	1,337	55	87	39.4	93	11	7	07	-2	54.5	1.7	....

W.S. = Wing scapulae
E. = Defective enamel
Im. = Impetigo

Lg. = Elongated prepuce
Fur. = Furunculosis
L. = Left

D. = Decay
St. = Stoop shoulders
L.C. = Lateral curvature of spine

—AND MENTAL FINDINGS—(Continued)

Vision		Stra- bis- mus	Defec- tive Hear- ing	En- larged Ton- sils	Teeth	Lymph Nodes		Pre- puce	Testes	Skin Dis- ease	Pos- tur- al De- fects	Point Scale Score	Binet Age	Normal = 100		Physi- cal Per- centile (Nor- mal = 50)
O. D.	O. S.					Cervi- cal	Epi- troch- lear							Binet I. Q.	Point Sc. I. Q.	
20/20	20/30	0	0	0	0	++	0	Lg.	0	0	0	64	11	70	75	50
20/20	20/20	0	0	0	D.	0	0	0	0	0	0	55	9.6	68	69	57
20/30	20/30	C. +	0	+	D.	+	0	Ph.	Cry.	0	0	46	9	75	62	39
20/20	20/20	0	+	++	D.	+	0	0	Cry.	0	W.S.	65	10.6	71	81	18
20/20	20/20	0	0	R.	D.	+	+	R.	0	0	L.C.	60	10.6	67	72	41
20/30	20/40	0	+	++	D.	+	0	R.	0	0	L.D.	64	10.4	66	77	51
20/200	20/50	0	0	0	D.	0	0	0	0	0	0	78	11.8	72	91	
20/20	20/20	0	0	+	0	+	0	0	0	0	St.	59	9.8	67	73	61
20/50	20/40	0	0	R.	0	+	+	Lg.	0	0	0	51	9.4	76	68	06
20/20	20/20	0	0	+	D.	+	0	0	0	0	0	64	10.8	69	76	49
20/20	20/30	0	0	+	D.	+	+	Ph.	0	0	0	62	10.4	73	78	47
20/20	20/20	0	0	R.	D.	0	0	0	0	0	0	66	10.2	72	86	16
20/30	20/30	0	0	0	D.	++	0	0	0	0	0	51	8.6	86	85	55
20/20	20/20	0	0	0	0	++	0	0	0	0	0	70	11	68	81	35
20/20	20/40	0	0	++	0	++	0	Lg.	0	0	0	64	10.4	71	80	33
20/30	20/100	0	0	0	D.	0	+	0	0	0	St.	55	9.4	50	58	-3
20/30	20/30	0	+	0	D.	0	0	0	0	Im.	St.	35	7.4	44	39	37
20/40	20/40	0	0	0	D.	0	0	0	0	Fur.	0	47	8.8	50	50	16
20/20	20/20	0	0	+	0	+	0	R.	0	0	0	36	8.4	66	47	40
20/40	20/30	0	0	0	0	+	0	R.	0	0	0	35	8	56	44	11
20/40	20/40	0	0	0	0	0	0	R.	0	0	W.S.	38	7.2	42	42	12
20/100	20/100	+C.	+	0	0	0	0	0	0	0	0	59	10	58	65	10
20/30	20/70	0	++	+	0	0	0	0	0	Acne	0	63	10.2	64	74	37
20/30	20/30	0	+	0	0	+	0	0	0	0	0	39	8	58	49	40
20/20	20/30	0	+	0	0	0	0	0	0	0	St.L. C.	15	6.4	33	16	13
20/40	20/50	+D.	0	0	D.	0	0	0	0	0	0	22	6.6	40	26	64
.....	.....	0	0	+	D.	+	0	Lg.	0	0	W.C.	17	5.4	64	39	36
.....	.....	0	0	0	D.	++	0	0	0	0	0	15	4.4	24	24	35

C. = Convergent
Cry. = Cryptorchidism
Ld. = Lordosis

D. = Divergent
M. = Malocclusion
R. = Removed

Ir. = Irregular
Ph. = Phimosis

TABLE 3.—SUMMARY OF PHYSICAL EXAMINATIONS

	Cases						
	Normal	Dull Normal	Borderline	Moron	Imbecile	Total Normal	Total Defective*
Number of cases.....	41	24	15	9	4	65	28
Average height percentile.....	52.7	52.6	30.8	11.0	27.3	52.7	23.1
Average weight percentile.....	52.7	63.7	53.0	25.4	51.0	56.7	43.9
Average right grip percentile.....	66.3	50.4	48.1	27.8	10.3	62.7	34.4
Average left grip percentile.....	70.5	68.0	44.3	24.3	36.5	66.6	35.4
General percentile average.....	60.6	59.7	44.2	22.1	31.3	59.7	34.2
Minimum height percentile.....	8	0	0	-7	-2		
Maximum height percentile.....	96	95	92	32	55		
Variation.....	88	95	92	39	57		
Minimum weight percentile.....	8	5	6	5	-9		
Maximum weight percentile.....	94	97	95	59	98		
Variation.....	86	92	89	54	102		
Minimum right grip percentile.....	2	9	7	0	-26		
Maximum right grip percentile.....	102	93	85	93	50		
Variation.....	100	84	78	93	76		
Minimum left grip percentile.....	9	8	9	-3	-15		
Maximum left grip percentile.....	110	96	88	50	86		
Variation.....	101	88	79	58	101		
Head girth deficit.....	0.5	0.7	1.0	2.7	0.2	0.6	1.4
Percentage cases with							
Vision below 20/30, O. D.	11.8	4.5	13.3	45.4	50.0	8.9	26.9
Vision below 20/30, O. S.	11.8	13.6	26.7	45.4	50.0	12.5	34.6
Strabismus.....	7.3	12.5	6.7	11.1	25.0	9.2	10.7
Defective hearing.....	2.4	25.0	13.3	45.4	25.0	10.8	25.0
Hypertrophied tonsils.....	24.4	41.7	46.6	22.2	25.0	30.8	35.7
Tonsils removed.....	9.8	12.5	20.0	0	0	10.3	10.7
Tonsils removed or hypertrophied	34.2	54.2	66.7	22.2	25.0	41.6	46.4
Dental defects.....	43.8	62.5	66.7	33.3	75.0	53.8	57.2
Enlarged cervical glands.....	53.6	33.3	75.0	33.3	50.0	67.8	60.8
Enlarged epitrochlear glands ...	14.7	33.3	20.0	11.1	0	21.6	25.0
Skin disease.....	17.1	0	0	33.3	0	10.3	10.7
Postural defects.....	19.5	16.7	26.7	33.3	50.0	13.5	31.2

* Including borderlines.

The physical percentile (general average) was obtained by averaging the percentiles for height, weight and right and left grip and therefore is comparable with the "psychophysical" percentile of Doll,⁷ except that he included also the figure for vital capacity. The reader is again reminded that the norm for the intelligence quotient is 1.00, and for all percentiles is 50. The averages in the small imbecile group are unduly influenced by a single physically exceptional case.

The chief feature of our results, that the physical group average is proportional to the mental status of the group, is in agreement with the work of Porter, Christopher, Smedley, Doll and many others (see Doll's monograph⁷), but we should like to emphasize again, by reference to our figures, that this is true of groups only. For instance, nineteen of our forty-one normal cases (46.4 per cent.) showed height percentiles below 50. On the other hand, one imbecile and three borderlines (14.6 per cent.) out of the defective groups were above 50 for height. Seventeen of the dull normal and normal groups (26.2 per cent.) were below 50 for weight, while ten (35.7 per cent.) of the defectives were above 50. Eighteen (27.8 per cent.) of the normal groups were below 50 for right grip, and fourteen (21.6 per cent.) for left grip, while of the defective eleven (39.3 per cent.) were above 50 for right grip and twelve (42.8 per cent.) for left grip. These facts do not affect the fact of physical inferiority in mental defectives as a *group*, but it certainly rules out any diagnostic value in physical measurements for mental capacity.

Certain special phases of the physical examination could be related to mental status. In the dull normal group it will be seen that the percentage of boys with hypertrophied tonsils and chronic lymphadenitis (probably also with adenoid growths) was much larger than in the normal group, and this fact may be of considerable significance in explaining retardation.

Faulty vision⁸ was found more frequently in the retarded and defective groups than in normal groups. This confirms Burpitt's⁹ observations. Only 8.9 per cent. of our normals had less than 20/30 vision for the right eye, and 12.5 per cent. for the left, while 26.9 per cent. of the defectives had less than 20/30 for the right, and 34.6 per cent. for the left. The differences between the normal and dull normal groups for vision are not striking. Defective hearing, on the other

7. Doll, E. A.: Anthropometry as an Aid to Mental Diagnosis. Publications of the Training School at Vineland, N. J. Research Dept. No. 8, February, 1916.

8. For summaries of previous work on the special senses in defectives the work of Whipple (Manual of Mental and Physical Tests, Baltimore, Warwick and York, 1914, Part 1) should be consulted.

9. Burpitt, H. R.: Mental Retardation, Nutrition and Eyesight in School-children. Ophthalmoscope, 1915, **13**, 442.

hand, was found in 25 per cent. of the dull normals as against 2.4 per cent. for the normals, a highly suggestive fact. For the normal group as a whole 10.8 per cent. showed defective hearing, as compared with 25 per cent. for the defectives.

Postural defects were also more frequent in the defectives, occurring in 31.2 per cent. and in only 18.5 per cent. of these normals. This observation has, we believe, not been made before.

Other physical abnormalities, such as dental caries, cervical and epitrochlear adenitis, genital defects and skin disease, are about evenly distributed between the normal and defective groups.

OFFENSES

In a group of eighty-five boys not committed for dependency or neglect, the offenses were distributed as shown in Table 4.

TABLE 4.—DISTRIBUTION OF OFFENSES

	Stealing	Truancy	Incorrigibility	Burglary
Normals.....	20	5	7	4
Dull normals.....	7	9	5	0
Borderlines.....	6	2	2	4
Morons and imbeciles	3	4	7	0

Stealing and burglary formed 54.5 per cent. of the offenses in the normal groups and 46.4 per cent. in the defective groups, not a striking difference.

HOME CONDITIONS

In the case of defectives, feeble-mindedness is in itself a sufficient explanation of delinquency. In the case of normal children, however, it was believed that a study of environment might have considerable sociologic interest. Such an investigation was carried out by Miss Rosenshine in the case of fifty-five of our normal or dull normal groups, and is summarized in Chart 5. We do not care to make a detailed analysis of these findings, leaving this task to more experienced interpreters of social conditions, but we may point out that in nearly every case the home conditions were very unfavorable; this and the lack of home influence of any kind are important contributing causes of juvenile delinquency.

A frequent problem with which we have met is the case of the children of immigrants, especially of the non-English speaking class. It frequently happens that the parents have failed to adapt themselves to their new environment and their children suffer the double handicap of poverty and the conflict, expressed in many ways, between old and

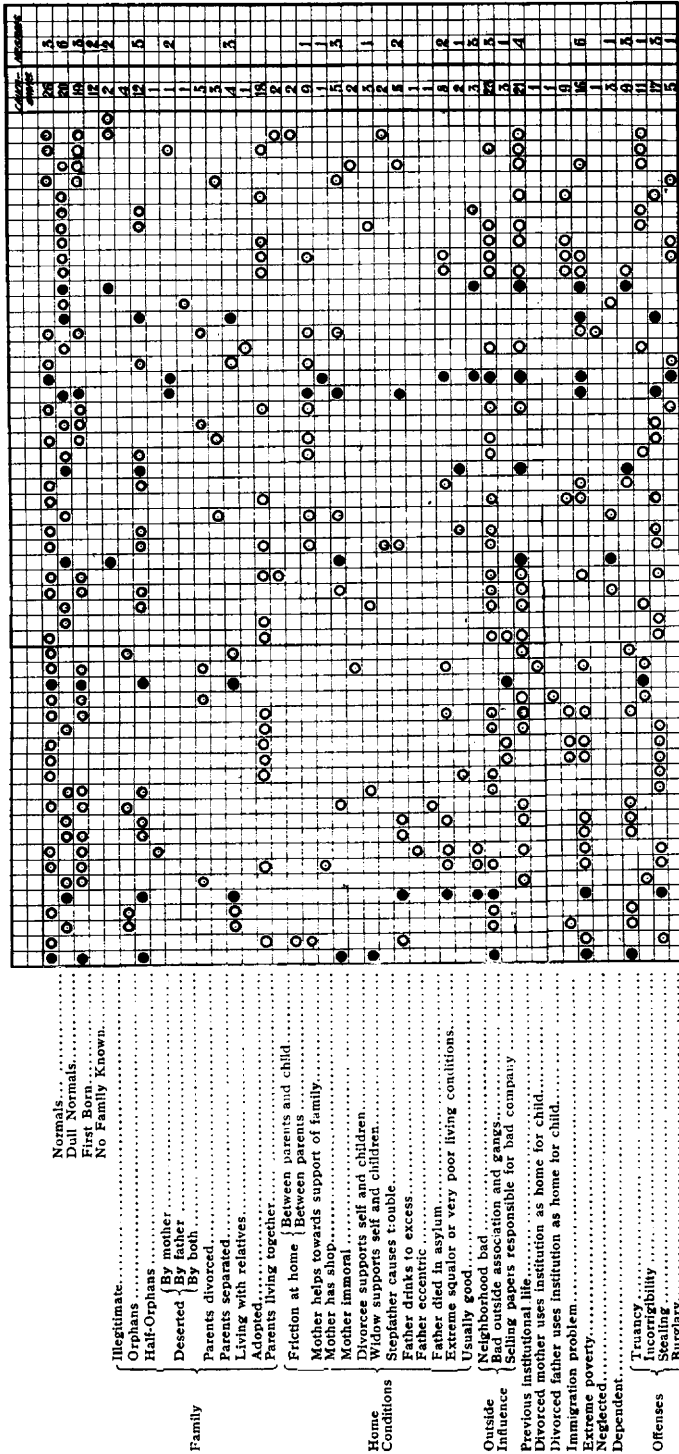


Chart 5.—Summary of environmental conditions, normal and dull-normal groups. Whites = ○; negroes = ●.

new world modes of life. This means in nearly every case the loss of home influence.

The frequency of illegitimacy, prostitution, divorce, and heavy drinking in the families investigated also deserves mention.

CONCLUSIONS

Our survey is of a group of juvenile offenders, and so is of importance as reemphasizing the physical, mental and moral problems which the community must solve before it can hope to deal helpfully with the problem of delinquency. The physical findings are, on the whole, those of neglected hygiene, secondary in most cases to poverty. The mental findings show that of the boys studied 43.6 per cent. were normal, 25.5 per cent. dull normal (total normals 69.1 per cent.), 17 per cent. borderline, 9.6 per cent. morons, and 4.3 per cent. imbeciles (total defectives 30.9 per cent.). A study of the normal and dull normal groups brings to light various unfavorable home conditions. We cannot avoid the conclusion that for the normal boys improved environment, improved personal hygiene, and better general education would have made useful citizenship possible.

In any group such as the one with which we have dealt, the first indication is obviously to separate the normals and dull normals from the rest, to keep the borderline cases under observation, with careful and systematic attempts at education in order to determine and develop latent ability; and finally to segregate promptly those who are beyond question feeble-minded.

Of these problems the reeducation of normal individuals who have become delinquent is at once the most difficult, the most hopeful and the most important. Without special and extremely capable training these boys, who have potentialities not only of "floating" in society and of becoming good citizens, but even, in some instances, of attaining positions of superiority, will inevitably return to a career of delinquency or crime from which at a slightly later age it will be impossible to rescue them. Any institution such as the one we have studied must choose whether it will be a place of intelligent rehabilitation or a feeder to the criminal class.

About half the physical examinations were made by Dr. H. H. Yerington and Dr. W. L. Adams, and several special eye examinations were performed by Dr. Hans Barkan. For these, grateful acknowledgement is made.