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Human Efficiency

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HUMAN EFFICIENCY¹

A Plan for the Observational, Clinical and Experimental Study of the Personal, Social, Industrial, School and Intellectual Efficiencies of Normal and Abnormal Individuals

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The questions of first importance in the study of mental defectives are the questions of etiology, remedy and criminal responsibility. Etiology naturally claims a large share of consideration, because it is only after the etiological factors or agents of different abnormalities have been precisely determined, that we are in a position to prescribe effective remedial and prophylactic treatment, or to deal successfully with the educational problems affecting defectives.

The criminal and legal aspects likewise deserve a large measure of attention. Various forms of mental abnormality predispose toward criminality. It is of vital social importance to determine what types or classes of defectives lack moral insight, an appreciation of moral values, the ability to distinguish between right and wrong, or truth and error, the power of self-control, and the feelings of shame, obligation and guilt. What classes of defectives are incapable of living in a normal human environment? How do criminalistic tendencies and moral discernment vary with degree of defect, type of disease (*e. g.*, delusional insanities, epileptic manias), duration of disease, transitory states (well known are the occasional or transitory states of moral irresponsibility in some form of epilepsy and in delusional and manic-depressive forms of insanity, which show themselves in maniacal outbursts, and kleptomaniac, suicidal and homicidal tenden-

¹Read, in part, before the New York Branch of the American Psychological Association, Feb. 4, 1911.

Owing to the limitations of space it is impossible to enter upon a discussion here of the numerous questions connected with the psycho-clinical examination of defectives. The reader is referred to a companion article in the March and April numbers of the *Journal of Educational Psychology*, which treats of the functions of psycho-clinical laboratories in universities, medical schools, hospitals for the insane, institutions for the feeble-minded, juvenile courts and the public schools, and which discusses the qualifications needed by psycho-clinical examiners.

cies), and environmental conditions? The obligation of the state properly to protect the lives of its subjects, renders the study of questions affecting the moral responsibility of various kinds of defectives of fundamental social importance. The solution of the practical educational, custodial and legal problems concerning defectives will hinge largely upon the answers which scientific investigation gives to questions of this nature.

While the medical and legal questions are thus of commanding importance, it is also important to secure accurate knowledge concerning the personal, social, industrial, school and intellectual capacities and incapacities of various grades and classes of defectives, such as idiots, imbeciles, morons, lag-gards, epileptics and insane, blind, deaf, mute and crippled persons. There are thus five sides to the question of efficiency.

First of all, what is the *personal* efficiency of a given grade or class of defectives? What can the individual do for his own care and protection? Can he feed and clothe himself, avoid dangers and temptations, control the primal instincts of appetite, sex, love, hate, anger, fear, jealousy, pugnacity, etc.? Where does he stand in the *personal efficiency* scale? What is the amount of his *personal efficiency retardation*, as measured in terms of the personal capacities of a normal person of the same age? The answer to these questions involves the establishment of *age norms of personal efficiency*—a task that probably cannot be done with any nicety except for the first years of life.

In the *second* place, what is the nature of the *social* capacities or incapacities of a given defective, or a typical defective of a given class? Is the individual able to communicate his ideas or desires through written or oral language or through cries or gestures? Can he converse coherently or intelligently? Does he seek or avoid social intercourse, conversation, entertainments, games, etc.? Is he socially-minded or anti-social? Is he chummy, entertaining, generous, sympathetic, timid, retiring, fretful, suspicious, deceitful, quarrelsome, slanderous, brutal, murderous, lascivious, sexually immoral, subject to exhibitionism, or negativism, lying, thieving, etc.? Does he fit into the social organism? Can he so adjust himself to the customs and rules of society that he will not become a public menace? In short, what is the character of the individual's social deviation? What is his *social efficiency* age? Is he on the level of the morally undiscerning civilized young child, or in the stage of the brutal adult savage?

In the *third* place, what is the *industrial and vocational*, or *motor*, efficiency of various defectives? What kinds of work can they do, and how well? How much can they do for

their own support? What particular capacities are present or lacking? What special existent occupational interests may be utilized? What is the individual's attitude toward work and toward supervision and correction? What are his learning capacities? What working habits can he form? What new tasks can he master? To what extent are his industrial capacities improvable by training? What is his best line of work? How does his industrial efficiency vary from time to time? (Witness the striking variations in epileptics.) What is the productive capacity of a given defective in comparison with a normal person of like maturity, and to what extent can the productive capacity be increased? In a word, what is the *amount* of the *motor* or *industrial defect*, or what is the *motor* and *industrial age*, of a given defective? These questions demand solution before the pedagogy of the industrial and vocational training of defectives can be placed upon a satisfactory basis, and before the labor of the patients in institutions for defectives can be so organized as to afford maximal returns.

In the *fourth* place, what is the nature of the *academic* or *school* capacities of different grades and classes of defectives? What sort of lessons can be mastered? In which branches do they make progress? Which subjects are worth teaching? What methods must be employed to obtain maximal results? How does the *rate* of progress differ from the normal rate (the rate with normals)? What is the precise rate and character of the improvement from month to month or year to year, as measured by scientifically devised serial tests of equal difficulty, of those mental functions which are central in the learning process; namely, perception, attention, association, memory, imagination, linguistic construction and reasoning? What sorts of improvement prove to be permanent, what merely transitory? What are the special difficulties of a given defective? What are his native or acquired interests, attitudes, ability to observe, judge, reason, form habits, adapt himself to changed schedules and new conditions, to learn by instruction, or imitation, or hit-and-miss experimentation, or repetition (drill processes), or reasoning? How many years *over-age* is the child for his grade? That is, what are the nature and extent of his *pedagogical retardation*? What is his *pedagogical age*? We cannot hope to adapt our curricula to the varying needs of defective children until we have thrown the search-light upon these vital school problems.

Finally, we have the basal question of the *character of the intellectual disorganization* and the *degree of the intellectual arrest* of various defectives. This question is fundamental, because all the other capacities depend more upon the intel-

lectual integrity of the individual than upon the integrity of any other group of functions. Here we must ascertain, not so much the range of the individual's information or his *erudition*, as the degree and character of his *native* and *acquired* intellectual *grasp, capacity, or ability*. Is his intellectual development normal, or has it been arrested from the start, or has it become atrophied with time? What particular intellectual functions have suffered the greatest impairment? Where along the intellectual highway from the low grade idiot up through the imbecile, moron and laggard to the normal person, has the individual stopped? What, in a word, is the individual's *intellectual age*? Can this be determined in definite units, or by diagnostic age tests, more precisely than can be done by observation or by the use of school grades?

The above are fundamental questions which must be properly answered before we can presume to deal intelligently with the problems affecting the housing, segregation, care, treatment and education of public school and institutional types of defectives, or before we can deal intelligently with normal and supernormal children.

At The New Jersey State Village for Epileptics¹ we are attempting, in addition to medical, hereditary, and anthropometric research and cognate lines of psychological work, to throw some light upon these questions by observational, clinical and experimental methods, and have prepared a series of record blanks on which to record the data. These forms are uniform in size with the other forms in use in the institution and are so made that they can be gathered into book form, and thus provide a *case history* for each patient.

In order to determine the patient's *intellectual* status we are giving the *form board test*, which throws light upon the patient's ability to visually identify forms, upon his constructive capacity and his power of muscular co-ordination; the *hand dynamometry test*, which roughly tests the power of voluntary attention and effort, and particularly the power of muscular exertion; the *Binet-Simon diagnostic tests* of intellectual development (all of the above are on *Form I*); and a set of six *serial* or *consecutive controlled group tests* (*Form V*²). The latter tests are given serially (at present one set

¹ A laboratory of clinical psychology was established by the Board of Managers at this institution, on the recommendation of the superintendent, Dr. D. F. Weeks, in the fall of 1910.

² Four of the forms were distributed at the meeting. Form I also contains a number of miscellaneous tests; Form II deals with the "effect of convulsions on mental traits and capacities;" Form II is a "personal, social and industrial efficiency report;" Form IV is a "school efficiency report;" and on Form V is recorded "serial experimental tests of the growth and improvement of mental traits and capacities."

each month) to somewhat over thirty of our brightest epileptic school children, and to somewhat less than 100 dull, average and bright pupils from the second to the third high school grades in the public schools of Hopewell, N. J. Owing to our late start these tests can run this year only during six months; it would be better to give them once every second month during the course of a year; and, after norms have been established, once or twice a year. These group measurements embrace tests of the mental processes fundamental to intellectual operations (perception, attention, association, memory, imagination, and linguistic construction; tests of learning capacity are not included in this year's set. The aim has been to make each of the six successive tests in the same series equally difficult, and all so difficult that no one can make a perfect score, so that they may serve as an experimental *measuring scale* of the growth and improvement which various mental capacities or traits undergo from month to month or year to year. By giving them under the same conditions they will also afford a reliable *comparative scale* by means of which to measure the differences in the capacities of various classes of children and defective children, (normal, bright, dull) and the differences in the rate of improvement in these capacities. Several of these tests were originally prepared for use with a "dental squad" of Cleveland school children receiving special prophylactic and operative dental treatment, in order to measure in definite units the effects of such treatment upon mental efficiency. The use of these tests for this purpose during the past year has given gratifying results. By carrying out such tests as these, from season to season, or year to year, upon large numbers of normal, supernormal and retarded pupils in the schools, we shall be able to plot a *normal curve of improvement or development* of various mental traits, and thereby obtain more precise knowledge respecting the *development defects* or accelerations of abnormal children. The twelve tests which I have worked out—two are repeated during the following sitting in such a way as to transform them into new tests—may not afford the best measuring scales, but they furnish an initial set which can be altered and improved as experience demands. The materials for these tests, together with the directions for giving them, will appear in print in due course.

The Binet-Simon measuring scale, with which we have made a survey of the entire village, enables us to make quite a satisfactory determination of the degree of intellectual arrest. The tests, however, are vulnerable in their present form at various points. First, the *methodological technique* has not been sufficiently refined or standardized to meet with the

fundamental prerequisite of all scientific work, namely the establishment and employment of *controlled* and *standardized* conditions of testing, so that the experimental procedure can be exactly repeated. The further standardization of the tests cannot be made until they have been thoroughly tried out by expert examiners. By actual testing we shall acquire the best methods of giving the various tests.¹

Second, the scale requires *revision, rectification* or *amplification* at various points. Some of the individual tests are out of place, either too high or too low; the aggregate difficulty of the tests for a given age may be greater than that for a higher age; some tests are of questionable utility, notably those for the higher ages; the tests need to be extended so as to include more of the teens, and this is more difficult because in the teens one year makes less difference in intelligence than one year during the early years of childhood. Moreover, it is not yet certain whether the scale is applicable to the higher grade adult demented or to slightly retarded adolescents (it seems to apply fairly well to most *demented* idiots, and particularly to *amented* idiots, imbeciles and low grade morons); nor is it certain that the same tests are applicable to both boys and girls, except during the preadolescent period, owing to the difference in the physiological, psychological and pedagogical maturity of boys and girls of the same chronological age.

Third, after the tests have been repeated sufficiently often in a given school or locality to render them *familiar*, it is possible for the higher grade examinees to compare notes and *coach* one another. This will enable some pupils to pass the tests beyond their intellectual age, and will transform the measuring scale into a series of tests of the *ability to learn particular facts* or to acquire particular accomplishments, by dint of direct instruction. But the scale is not designed to test the momentary capacity to acquire a *determinate set of facts by special instruction*, but to measure the capacity to

¹For suggestions consult the following: Binet and Simon: *Le développement de l'intelligence chez les enfants*, I, *Année Psychologique*, 1908; Goddard: *Binet's Measuring Scale for Intelligence*, *The Training School*, VI, No. 11, 1910; Whipple: *Manual of Mental and Physical Tests*, 1910, Chapter XIII.; Huey: *The Binet Scale for Measuring Intelligence and Retardation*, *The Journal of Educational Psychology*, I, 1910, 435; Johnston (Katherine): *An English Version of M. Binet's Tests for the Measurement of Intelligence*, *Training School Record* (London), November, 1910. (The tests for age 11 are here transferred to age 12, leaving 11 unsupplied; the tests for age 12 are moved up to age 15; and the 13-year old tests, with two additions, become tests for ages beyond 15. This rearrangement probably meets with Binet's approval, since the revision was submitted, according to the author, to his criticism.)

solve certain problems without special preparation. They are intended to be a measuring rod of the intellectual capacity or strength which normal children of various ages and of a given type of civilization should have developed as a result of normal growth and development. They thus supply a series of *age norms* of native and acquired mental capacity; not of *native* capacity only, as has been assumed. It would be fatuous to attempt to construct a scale for the measurement of pure native capacity, for pure native capacity, after the first few month's of life, is a pure figment of the imagination. Only by excluding the physical and social environmental influences would there be any possibility of measuring native endowment independent of acquired capacity. A measuring scale will therefore measure both native and acquired capacity. Just as native capacity differs with individuals, so will the capacity to acquire differ with individuals; but there is probably a certain *rate* of acquisition which is fairly *normal* in a given order of civilization, so that it will be possible to establish *norms* which hold for the great mass of average or typical individuals.

Fortunately the difficulty of which we have just spoken—the possibility of being coached so as to pass some tests—can be met by devising *substitute* or variant forms of equal difficulty for some of the tests.

Fourth, the corrective formula, or the method of giving advance credits (one year for every five points passed in higher ages) sometimes creates difficulties. This is due to the fact that the number of tests in the various ages is not uniform. In four ages it is four (ages 4, 5, 10 and 12); in two it is five (3 and 11); in two six (8 and 9); in one seven (6); and in one eight (age 7). The consequence is that the subject sometimes receives too few and sometimes too many credits. To illustrate cases from my experience: if the subject passes age six by virtue of two failures in age seven, he can obtain one and one-fifth year of credit for age seven; *i. e.*, one-fifth of a year more credit than if he were credited outright as having passed age seven. The maximum discrepancies which I have found arising from these inequalities have amounted to about a year. This difficulty, however, is not innate in the tests themselves, and can be overcome by equalizing the number of tests in each age, and revising the corrective formula as may be needed.

The above are some of the criticisms suggested by the use of the Binet-Simon tests with somewhat over 350 epileptics. The fact that the tests have not been brought to a state of perfection makes it all the more imperative that they should be tried out with great *thoroughness* on a large number of men-

tally and physically normal public school children, so that we may locate the weak spots and construct a scale which will be valid for the typical American child. When returns have been collated from a large number of such tests, given under uniform conditions, we shall be in a position to eliminate, revise and amplify. This is *one* way in which the tests can be successfully improved. But it is necessary to emphasize that the testing must be a *thorough-going try-out*. To examine five or six pupils in an hour at a given level in the scale means partial and perfunctory work, and will render the try-out essentially unscientific. We cannot hope to establish reliable norms for children by a slap-dash examination of wholesale quantities of pupils. It is better to try the scale out thoroughly with 1,000 pupils than partially with 10,000.

A second way in which to improve the scale, is to undertake a systematic survey of the intellectual capacities of normal boys and girls at different ages. What, *e. g.*, can the typical six-year-old or 12-year-old boy or girl do intellectually? To answer this question fully we need to gather and compile extensive observational data from classroom teachers, expert paidologists, parents and intelligent observers who come into direct daily contact with children.

At the Skillman institution we are attempting to gather such data for our epileptic school children by means of a syllabus on the school efficiency of the pupils. School efficiency depends primarily upon intellectual capacity and thus furnishes an index of intelligence. From these reports, made by the teachers, we hope to gain information regarding the characteristic intellectual capacities of epileptics of various chronological and Binet-Simon ages and of various degrees of arrest. This information will possess a unique value when brought into correlation with other reports and the various experimental tests. As soon as we have extensive data of this character for large masses of normal children, we shall not only know something definite regarding the intellectual capacities of children of different ages, but we shall have taken an important step toward the construction of an adequate measuring scale of intellectual development. Such a programme of work as this can only be carried to a successful conclusion by a properly organized and a well-manned department of clinical psychology, or bureau of research, in the public schools, in a university, or in an endowed private research foundation.

It is probably not necessary to hold a brief in this day for the necessity of undertaking such a survey as this. There is a vast army of repeaters in the schools which threaten to

become a national menace. Statistics¹ from all sections of the country show that about half of the pupils in the public schools are retarded; that is, that they are two or more years over-age for their grade. At the present time, our ignorance concerning, and our neglect of, the best care, treatment and education of arrested children, stand out as a national disgrace. We know little at present that is scientifically accurate regarding the degree or character of the physical and mental arrest of our repeaters. We do therefore stand in need of comprehensive serial graded tests of intelligence, so that we may determine, not only the intellectual age of deviating children, but the nature of the mental functions most seriously affected, and the character of the arrest (whether permanent or temporary). It is sheer folly to spend millions of dollars trying to educate children for an intellectual career, who are permanently retarded. There are instances on record where arrested pupils have made practically no progress during a dozen years of schooling, or where they have actually retrogressed. We have with us 19-year-old epileptics who are doing second and third year work. We should be able to determine by means of a scientific diagnostic (intelligence) scale whether a given subnormal is a custodial or institutional case, or a case for one of the special classes in the public schools (for retarded, blind, deaf, mute children, etc.). Binet has given us a "first-aid-to-the-sick" device, just at the time that we are awakening to a realization of the magnitude of the problem of mental deficiency.

While the *intellectual measuring rod* is fundamental, we stand in need of a *motor scale* of development, or a combined intellectual-motor scale. This need arises from the fact that a sixteen-year-old child chronologically may have a twelve-year-old intellect and a fourteen-year-old musculature. Such a child is reasonably strong muscularly; he is able to execute and co-ordinate his movements with skill; he can perform quite complicated manual operations; he can master fairly difficult industrial tasks; he can retain motor acquisitions, and form stable muscular habits. Although he may be accounted an intellectual laggard, he ranks quite high in motor capacity and manual dexterity—a fact which is being demonstrated day by day in the manual training and industrial classes in the public schools. Such a child would, then, be fairly normal on the motor side.

Since, therefore, the intellectual and the motor developments will not in all cases coincide, we need a series of *motor*

¹ See *The New Clinical Psychologist and the Psycho-Clinicist*, The Journal of Educational Psychology, April, 1911.

diagnostic tests arranged in a graded scale, in order that we may know what a normal girl and boy can do industrially, or in a motor sense, at different ages. It should be possible to construct such a scale for, at least, the periods of childhood and early adolescence. Having both the intellectual and the motor scales, separate or combined, we shall be in a position to say whether the child's defects involve in equal measure the intellectual and the motor functions, or which of these two have suffered the most impairment, and to what *extent* the arrest has set in. The pedagogical value of such a differential diagnosis is obvious. Instead of allowing teachers to consume their energies and the energies of the pupils for years, trying by some sort of intellectual legerdemain to fit round boys and girls into square holes, we shall be able to prognosticate by means of standard tests the probable future pedagogical development of the arrested child, and thereby be able to plan a course in which he will make the greatest progress. This will not only redound to the good of the child, but prevent much pedagogical blundering, loss of time and money, and vexation of spirit.

Unfortunately there is no existent motor or industrial scale of development for normal children, comparable with the Binet-Simon intellectual scale. At Skillman we are making an attempt to construct such a scale for epileptics, by collecting extensive observational data from the officers, supervisors, attendants and employees of the institution, bearing upon the industrial capacities of the patients who are employed in various forms of indoor and outdoor work. From the results thus obtained we are hoping to construct a *motor scale of development* for each Binet-Simon age. It is evident that such a motor scale would possess greater value if we were in a position to turn, for purposes of comparison, to a motor scale for *normal* and *supernormal* individuals. The need of a normal industrial scale is felt as keenly by the student and trainer of the special child, *whether* subnormal or supernormal, in the *public* schools, as by the student and trainer of institutional types of defectives. Departments of child study in the public schools and research departments in institutions for defectives should make an attempt to gather extensive industrial or motor data by some such means as those we are now using.

Finally, we are also securing detailed reports on the *personal* and *social* traits and capacities, the *moral* characteristics and *criminal* tendencies of our patients. The data on the personal capacities will supply additional material for our comparative measuring scales. There is need of a similar systematic study particularly of the moral and criminal traits of the abnormal,

mischievous and delinquent pupils which people our schools, and of the criminals which menace our civilization. This data should be secured, in the first instance, for the socially maladjusted child in the preadolescent years, before the criminalistic tendencies have become confirmed. Only when we have in our possession extensive facts of this character will we be in a position to place our pedagogical and moral training and prophylaxis, and our custodial care and treatment of abnormal and criminal individuals upon a satisfactory basis.

When we have given the same amount of careful, expert study to our normal and abnormal human population that the government is giving to Indian corn or the American hog; when we have devoted the same scientific attention to the production of superb brain crops that experts, under government subsidy, are now giving to the growing of superior grain crops: then we may hope to make education a genuine science, and the institutional training, care, treatment or penalization of defectives, dependents or criminals a real art. The view that public institutions, in addition to their recognized duties, should function as research laboratories, is rapidly gaining wide acceptance. Just now we stand in great need of extensive *mass* studies: a broad survey of the total field of human capacity. It is with this idea uppermost that we have prepared a set of *efficiency* blanks at Skillman for the systematic recording of observations. The method at present must necessarily be somewhat crude. But in time we shall have just as refined a technique for studying the human plant as we now have for studying chickens or horses.