THE PSYCHOLOGY OF MENTAL DEFICIENCY

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Come wander with me . . .
Into regions yet untrod,
And read what is still unread
In the manuscript of God.

This thought, which a few generations ago was uppermost in the mind of the great Agassiz when making his geological explorations, is to-day finding one form of expression in the scientific laboratory for psychological research at Vineland, N. J., where investigations are being made on the causes and conditions of human degeneration and mental deficiency. More vigorously to-day than ever before in the history of civilization, social, educational and psychological investigations are being carried into all phases of life with its misery, happiness and usefulness. Associations for charities, children's aid societies, guilds, juvenile courts and public school authorities, are asking the psychologists and physicians what can be done with these unfortunate people, the mental defectives, who are contaminating society by their presence, absorbing the time and thought that should be devoted to normal children, and later filling the almshouses, charitable institutions and prisons with illegitimate and irresponsible offspring.

The psychologist who analyzes, classifies, describes and explains mental phenomena is beginning to work effectively on the insane, the criminal and the defective. From a psychological standpoint, the border line between dull, backward and retarded children and those mentally defective, lies in a difficult and unexplained region. The inadequate knowledge of mental capacities and the desirability of accurately expressing the relative educational values of such capacities makes the field a most fertile one for research. With others, Ayres and Gulick have been studying the "laggards of our schools" for the Russell Sage Foundation, and Witmer, a pioneer in the field, has established the Psychological Clinic for the study of the normal development of every child. What of truly subnormal and mentally deficient children?

The study of mentally defective children began in 1797 when some French soldiers found "the wild boy of Aveyron" in a forest and had him taken to Dr. Pinel, of Paris, for examination. Pinel pronounced him incurable, which caused the publication of a pamphlet three years later by Itard, "De L'éducation d'un Homme Sauvage." This was the first important contribution to the literature of the subject; the second
was from one of Itard's pupils, Seguin, who, in 1846, published his valuable work on the physiological treatment of mental defectives. About the middle of the last century, institutions for the care of defectives began to be organized throughout the world, and in 1904 Germany had 24, Sweden 33, England 12 and the United States 30 such homes. At the present time twenty-six of our states have a sum total of 25,000 children in institutions for feeble minded. The Vineland institution, in New Jersey, is one of the most progressive, and the psychological movement for which it stands is rapidly growing in importance and has many followers throughout this country and in some sections of Europe and Canada.

The best studies of the mentally feeble and defective have been made by Itard, Seguin, Howe, Powell, Ireland, Shuttleworth, Tredgold and Barr; among the psychologists who are formulating and trying out individual tests and finding methods of making mental diagnoses are Binet, Simon, De Sanctis, Meumann, Stern, Norsworthy, Thorndike, Goddard, Witmer, Huey, Whipple, MacMillan, Wallin and others; among physicians working in this field are Krenberger, Fernald, Wylie and Healy. One of the places where this study is being most successfully carried out is at Vineland, which has exceptional opportunities for research work because the institution is under private management as well as under state patronage, and it was here a psychological laboratory was founded in 1906, which was the first to be
permanently established in an institution for the care of mental defectives. The field is new and full of promise and the movement is rapidly growing in value and influences. This institution has comparatively few children (390 in all) and many of these come from wealthy families whose ancestry is known or from families who have lived in New Jersey for several generations. There are few communities of such stable population and so much inter-family marriage.

Institutional life and training is inferior, most of us will agree, to that of even a mediocre or low-grade home, but there are at least two groups of individuals who are exceptions to this general rule, the feeble-minded and the insane. Both are par excellence individuals of state concern and state protection because they are incapable of self-direction, self-control or self-support. The defectives, who are by-products of unfinished humanity, belong in institutions where they may be cared for, made happy and to some extent useful, and where they may be studied for the betterment of civilization.

**Lines of Investigation at Vineland**

Dr. H. H. Goddard, Superintendent Johnstone and their field workers, are spending much time at present on the problem of eugenics—study of heredity. The home of each inmate has been carefully canvassed in order to get data which may throw light on the problem of heredity. What has been the result? Three concrete cases will suffice to indicate general tendencies.

1. An alcoholic insane paternal grandfather, a tuberculous cancerous maternal grandmother, imbecile mother with feeble-minded sister married to imbecile father. Result: Five feeble-minded children, one dead, one in custody, all the rest at large.

2. An insane father, a feeble-minded mother, seven children all mentally deficient; one in proper custody, one married, three in almshouse with mother.

3. A feeble-minded paternal grandmother, a neurotic maternal grandfather, an alcoholic father, a neurotic mother with a “queer” sister; ten children, eight feeble-minded children, two uncertain; one of this family in proper custody.

All of the children indicated “in custody” are at Vineland. Proper care of the feeble-minded and epileptics would prevent this dangerous class from running at large and would help to solve the fundamental problem of the causes of mental deficiency (Figs. 2 and 3).

What are the controlling conditions of heredity? What are the results? The accompanying heredity charts which have been marked out with great care indicate controlling tendencies and suggest the question, Is Mendel’s Law of Heredity, which has been proved for plants and animals, applicable to human beings? This is another important
FIG. 2. HEREDITY CHART. Devised by Dr. Goddard, of Vineland, recently adopted by the American Association for Study of Feeble-minded and the American Institute of Criminal Law and Criminology and also used by Dr. Wm. Healy in his work in the Juvenile Psychopathic Institute of Chicago. This chart gives in graphic form the hereditary status of some cases at Vineland, N. J. Square = males; circle = females; clear square or circle means no data; $F$, feeble-minded; $A$, alcoholic; $T$, tuberculosis; $N$, normal; $C$, criminal; $S$, grave sexual offender; $d$.inf. means died in infancy; small black dot means miscarriage. Hand points to the child that is in the Vineland institution.

At the present writing three hundred and nineteen members of this family have been traced, one hundred and nineteen are feeble-minded and only forty-two are known to be normal.

problem being pursued. Dr. C. B. Davenport, who is the best authority in this country on eugenics, writes in a paper, soon to go to press, as follows:

APPLICATION OF MENDEL'S LAW TO HUMAN HEREDITY

For our purpose Mendel's law may be regarded as consisting of three principles. First, the principle of the unit characters of inheritable unit, each of which is, in accordance with the second principle, transmitted through the germ by a representative called a determiner. The third principle is that when the germ cells of both parents carry a determiner of a character the fertilized egg and the embryo derived from it have the determiner of the character double or

FIG. 3. THESE CHARTS ILLUSTRATE ONE TENDENCY IN THE THREE CASES JUST CITED, i. e., mentally defective parents are very prolific. A very careful study made by Dr. Tredgold in England revealed the fact that sixteen mentally defective women working as mill hands had given birth among them to one hundred and sixteen children.
duplex. When the germ cell of one parent only carries the determiner, this is simplex in the embryo. When neither parent carries the determiner the embryo is devoid of it. It follows that, if neither parent has a character none of their children can have it. If both parents have the character in question simplex, one fourth of their children will be without it; one fourth will have the character duplex and half will have it simplex again.

During the past ten years the study of the characters of plants and animals has revealed the nearly universal validity of this law—and during the past two or three years it has been shown to apply to many human qualities.

The law appears clearest in this form—when both parents lack a unit character all of their offspring lack it. Illustrations of this law are seen in the case of brown iris pigment. In case both parents lack it (and have blue eyes), all of their children have blue eyes. In case both parents lack curved hair all of the children have straight hair; if both parents have flaxen hair, the children are all like them; if the parents are blonds, lacking abundant skin pigment, so are their children. If both parents are defective in mental development, being imbecile, their children are all defectives.

When one parent is defective and the other has the additional character the children will have the character; but, since they get it from one side of the house only, the character is apt to appear in a diluted condition. Thus it may be confidently expected that the children of an imbecile and a normal parent will not all be as mentally strong as the stronger parent because their mental development depends on a simplex determiner.

The committee of eugenics of the American Breeders’ Association has established headquarters at Cold Spring Harbor in the vicinity of New York City. It desires first to assist in a propaganda for the study of pedigrees of the feeble-minded. It wishes to urge upon every training school the desirability of sup-

FIG. 4. DRAWING TEST. The upper drawing when reproduced by children of different ages indicates their mental development. The first copy shown, drawn by a white female aged eleven years, indicates a mental development of four years; the second, by a white female aged sixteen years, a development of five years; the third, by a white male aged eighteen years, a development of six years, and the fourth, by a white male aged nineteen years, a mental development of seven years. Reduced to one half.
porting at least one field worker who shall visit the homes whence come defective pupils and determine the mental condition of other individuals of the same germ plasms as are united in the pupil question. The Vineland School has set a shining example of this work and has achieved striking results. These studies really ought to be carried on in every state, not merely to confirm the laws of heredity of imbecility but to determine the main blood lines of imbecility coursing through this country.

So far we have considered the causes of mental deficiency of hereditary origin. The causes in general may be grouped roughly under direct, which are due to heredity or disease, and indirect, due to sense defects and accidents. About 85 per cent. of the cases may be traced to conditions prior to birth, such as bad heredity, neurotic conditions, alcoholism and tuberculosis. Injuries at birth are at the present time rare and are responsible for not over 1 per cent., according to the best authorities. The remainder may probably be counted for by accidents, infectious diseases, epilepsy, malnutrition, etc., after birth.

**FIG. 5. Placing Blocks in the Form Board.** With this form board, another type of test used in America, the child is required to place the ten blocks as rapidly as possible in their respective places. The experimenter observes and notes superficial and jerky movements, the adoption of a method or system, i.e., hunting the block to fit the space and *vice versa*, the ability to profit by experience when the test is repeated, the ability to increase a set pace of procedure, the degree of sustained attention, the span of motor control, and many other phases of mental expression. One bright boy of ten recently placed the blocks in their respective places in twelve seconds and a defective of nineteen required, after much urging and many vacillating and uncoordinated movements, seven minutes and eighteen seconds. Dr. Healy, psychopathologist for the Chicago Juvenile Court, has modified this type of form board by having the geometric forms a part of a puzzle picture which covers the face of the board.

This test alone throws much light on the mind of a child and may be used as a diagnostic test for children of varying grades of arrested mental ability.

**FIG. 6. A Test for Reflex Action and Motor Control.** The apparatus as shown consists of a piece of glass in a frame which is struck by a rubber hammer. Low-grade defectives seldom win.
Another line of activity in the Vineland research department has been the gathering of statistics on physical growth of defectives. A report of this work may be summed up as follows:

The lowest grades (idiots) are from two to four inches shorter and from five to fifteen pounds lighter than normal children of corresponding age.

The middle grades (imbeciles) are less than half this amount below normal, while the highest grades (morons) do not differ appreciably from normal children except that there is a tendency to become heavy.

Commenting on these results Dr. Goddard writes, "Normal children begin to grow fast at about eleven years. Among defectives this acceleration does not come until two years later, but when it does come it is a greater acceleration than in normals. This is not yet accounted for but it suggests that it may have an important bearing upon our treatment of school children at that critical age of eleven to fifteen."

The difficulty with these measurements, like all others on normal children, is the fact that they are based on one measurement of a large number of individuals and not on repeated measurements of the same individuals. An investigation soon to be published by the writer shows that two characteristics of growth of which Dr. Goddard has found true of deficient children, are characteristic of normal children as well. That is they naturally form two groups at adolescence, the short boys and girls beginning their rapid growth from one to two years later than the tall boys and girls, and there seems to be a direct correlation between rapid growth at adolescence and the advent of puberty for both boys and girls, the shorter ones maturing later than the tall ones.

CLASSIFICATION OF MENTALLY DEFICIENT CHILDREN

Dr. Howe, who is best known from his work with the blind, attempted to group all mentally deficient children under the headings "simpletons," "fools" and "idiots," but the most widely accepted classification to-day is that of Dr. Barr, of the Elwyn Training School, Pennsylvania, who classifies them as "feeble-minded," "imbeciles" and "idiots."

A new classification has recently been adopted by the American Association for the Study of the Feeble-minded. It is functional rather than physiological and is as follows:

<table>
<thead>
<tr>
<th>Mental Age</th>
<th>Capabilities</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under one year</td>
<td>Helpless.</td>
<td>Low</td>
</tr>
<tr>
<td>1 year,</td>
<td>Feeds self. Eats everything.</td>
<td>Middle</td>
</tr>
<tr>
<td>2 years,</td>
<td>Eats discriminatingly.</td>
<td>High</td>
</tr>
<tr>
<td>3 years,</td>
<td>No work. Plays little.</td>
<td>Low</td>
</tr>
<tr>
<td>4 years,</td>
<td>Tries to help.</td>
<td>Middle</td>
</tr>
<tr>
<td>5 years,</td>
<td>Only the simplest tasks.</td>
<td>Imbecile.</td>
</tr>
<tr>
<td>6 years,</td>
<td>Tasks of short duration. Washes dishes.</td>
<td></td>
</tr>
<tr>
<td>7 years,</td>
<td>Little errands in house. Dusts.</td>
<td>High</td>
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FIG. 7. AN EXPERIMENT IN ACTION WITH THE ERGOGRAPH.

<table>
<thead>
<tr>
<th>Mental Age</th>
<th>Capabilities</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 years</td>
<td>Errands. Light work. Makes beds.</td>
<td>Low</td>
</tr>
<tr>
<td>9 years</td>
<td>Heavier work. Scrubs, mends, lays bricks, cares for room with simple furniture.</td>
<td></td>
</tr>
<tr>
<td>10 years</td>
<td>Good institution helpers. Routine work. Middle</td>
<td>Moron</td>
</tr>
<tr>
<td>11 years</td>
<td>Fairly complicated work with only occasional oversight.</td>
<td></td>
</tr>
<tr>
<td>12 years</td>
<td>Uses machinery. Cares for animals. No supervision. Can not plan.</td>
<td>High</td>
</tr>
</tbody>
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FIGS. 8 and 9. ERGOGRAMS. Records of a normal man and of a defective boy, the latter showing characteristic irregularities.

The ergograph was devised by Mosso, an Italian psychologist, and is used to measure muscular fatigue. A weight is lifted with one finger every alternate second until the muscle is tired out. Each lift is recorded on a vertical line and the sum total of lifts and lengths of lines are indicative of muscular action and voluntary control.
An idiot, according to this classification, can not reach a degree of mentality beyond that of a normal child of three years, an imbecile beyond seven and a moron beyond twelve. This has been determined by means of a series of tests.

Mental and Physical Tests

There have been several attempts during the past fifteen years to formulate a series of graded tests which will evaluate children’s span of intelligence and measure mental defects by means of comparison with posited norms. Binet has been at work longest trying to formulate such tests and with some success and while the Vineland and Lincoln institutions are adopting the Binet and Simon tests for work with feeble-minded children, the University Elementary School, of the University of Chicago, and the Psychopathic Institute, of the Chicago Juvenile Court, are establishing norms for normal American children.

The Binet and Simon tests throw little light on the moral or physical nature of the child, and they do not allow for sense defects, which would naturally affect a child’s standing, even though normal in other respects. The latest edition of these tests takes into account the age of the child, and eliminates almost entirely the factor of training by measuring what the child learns fortuitously. They thus form a “measuring scale for intelligence” and are of direct value and interest to all parents and teachers of normal as well as backward or defective children. The fifty-seven tests cover the period from three to twelve years, and if a child succeeds in the tests derived for his age, he is normal; if he can succeed only in the test devised for a child one year
younger, his development is arrested to the extent of one year, and similarly for two or three years. If he is unable to do the tests for more than three previous years, he is mentally defective and his mental age is determined by the tests which he can accomplish.

The test for a child of six years of age mentally is as follows: Shows right hand, left ear. Repeats sentences of 16 syllables. Distinguishes pretty from ugly or deformed faces, in pictures. Defines, in terms of use, the words table, chair, horse, mama. Performs three commissions given simultaneously. Knows age. Knows whether it is forenoon or afternoon.

The tests for seven are: Notes omission of eyes, nose, mouth or arms, from portraits. States number of fingers on right hand, left hand, both hands. Copies written sentences, with pen, so they can be read. Draws diamond-shaped figures from copy (child of mentality of six years can not do it. See illustrations, Fig. 4.) Repeat five numbers in order, when heard once. Describe a picture shown. Counts 13 pennies, one by one.

Mentally defective children seldom reach the mentality of a normal child of twelve years, who can meet the following requirements. Rearranges shuffled words of eight-word sentences. Repeats seven numerals in order, when heard once. Names three words that rhyme with obey, in one minute. Repeats, with no errors, sentences of 26 syllables. Infers a fact from given circumstances which indicate the fact.

Three hundred and seventy-eight defectives at Vineland have been tested with the complete Binet tests with the following results:

![Figure 11. An apparatus devised by Dr. Goddard for testing the ability to recognize objects by the sense of touch (stereognostic sense).](image)

![Figure 12. The Maze Test for Motor Control. Reduced to one half. A device first used at Columbia University for testing the ability to trace the white line in a given interval of time. Frequent contact with the sides indicates poor motor control. High-grade feeble-minded children usually make from 60 to 100 contacts. The tracing reproduced was made by an epileptic and contains 84 contacts.](image)
The following photographs show types of tests, used for making mental diagnoses of children at Vineland, the Lincoln Institution in Illinois, the University of Chicago, the Chicago Juvenile Court, Columbia University, University of Pennsylvania, University of Washington, University of Texas, and similar institutions (Figs. 4 to 14).

The foregoing tests and experiments show that mentally defective children offer excellent material for psychological investigation, since they are a more or less isolated group with quite definite boundaries and are dependent on others. They may be observed continuously during their lifetime, they are incapable of being stimulated or enthused by artificial reactions, they are not easily embarrassed or self-conscious; some of their mental processes are slowed down, others almost eliminated and some grossly exaggerated; their motor reactions are usually the direct result of their ideas with little inhibition, decision, choice or judgment, and may therefore be considered fairly safe criteria of the concomitant mental activities. The various stages of mental deficiency frequently parallel the stages of development of the normal mind and since the defective mind may remain for a lifetime at a given level, it may be studied in such a manner as to shed much light on the corresponding stages of the developing mind of the normal child, which is so fleeting in its passage to higher levels.

Finally: 1. Defectives are worthy of careful study for their own sake, for the welfare of society, and for the scientific insight they offer into the mental processes of normal children and the problem of education.

2. They offer, where their ancestry may be traced, the best material at present available for the study of human heredity on account of the pronounced deviations which may be traced.

3. They have so far contributed most to the scientific application of "mental and physical tests" which dominates contemporary tendencies in child psychology and its application to education.

4. Mental defectives present tremendous sociological difficulties in
FIGS. 13 and 14. PRECISION TESTS IN MOTOR CONTROL. The girl in the picture is a high-grade imbecile and is able to thread this large needle and touch the copper points with the stylus. A child of slightly lower grade could do neither.

the advancement of our present-day civilization and educational progress. As cure is impossible, the two chief sources of prevention suggested are to keep such people segregated in institutions and to prevent marriage. Other means may in extreme cases be justifiable; sometimes sterilization is found advisable, but popular opinion usually rebels against such measures.