A Study of the Performance of Matched Mental Age Groups of Mongoloid and Normal Children on the Revised Stanford-Binet Scale, Form L, and the Goodenough Draw a Man Test

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A STUDY OF THE PERFORMANCE OF MATCHED MENTAL AGE GROUPS
OF MONGOLOID AND NORMAL CHILDREN ON THE REVISED
STANFORD-BINET SCALE, FORM L, AND THE
GOODENOUGH DRAW A MAN TEST

by

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Master of Arts

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LIFE

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Since 1948, as a Daughter of St. Mary of Providence, she has worked with the mentally retarded children at St. Mary of Providence School.
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CHAPTER I

INTRODUCTION

Mongolism has been the subject of numerous investigations, most of which tend to center their interest around the etiology, incidence, and physical characteristics of this type of mental deficiency. Many psychological studies are available, however, and those of more recent appearance are giving evidence that the mongoloid is able to attain to a higher level of mental and social development than was formerly believed. Throughout the literature, especially in the older studies, one finds the label of "mongolian idiocy" ascribed to these subjects as descriptive of their mental status. The more current findings reveal that most mongoloids fall in the imbecile classification. The present study has as one of its aims the investigation of the mental level, as obtained on the Revised Stanford-Binet scale, Form L, of a group of mongoloid children attending a private school for retarded girls.

As indicated by previous investigations of the mentality of the mongoloid, it is anticipated that the present study will embrace the lower levels of the Binet scale. There are many quantitative studies and an increasing number of
qualitative studies dealing with the performance of both mental defectives and intellectually normal individuals on the Binet but these relate chiefly to children of at least school age. Investigations treating specifically of the responses of mongoloids or of pre-school children are quite meager.

Of the studies of the comparative difficulty of the subtests of the Stanford-Binet, Form L, which include data dealing with the levels below year VI, there is some lack of agreement in their conclusions. Arthur L. Rautman¹ considered as reliable and as of importance the differences found within the separate year levels, whereas Virginia Fleming² reported the subtests within each level were similar in difficulty. The latter suggests caution, however, in the preparation and analysis of data, for she noted that with only very small variations in range of mental age, different results were obtained.

Since the present investigation will be of a group of mongoloid children and of a second group of normal children of the same mental age, the influence of life age most prob-


ably will be a factor for consideration. Rautman studied the rela-
tive effect of chronological age in addition to the comparative
difficulty of the subtests of the Binet. He compared the perform-
ances of young, middle, and older groups of individuals of approx-
imately the same mental age and found there were few statistically
reliable differences until year VI, at which level and succeeding
levels a larger number of cases was studied. Nevertheless, for
all levels he concluded that greater life age and experience do
effect differences in performance on some items of the Binet
scale.

From data obtained from studies of the performance of
individuals of varying intellectual capacity on intelligence tests,
it appears to be quite generally accepted that mental defectives
are more successful on items dealing with concrete situations,
whereas mentally normal persons perform better on tests dependent
on verbal reasoning ability. It is the intent in the present
study to note any consistent patterning in success or failure on
the subtests in the Revised Stanford-Binet scale, Form I, for
the mongoloid group as compared to the normal group of matched
mental age.

3 Rautman, "Relative Difficulty of Test Items of the
Revised Stanford-Binet: An Analysis of Records from a Low In-
On the Binet scale, below year VI, though there are a number of verbal items, the majority of tests are of a concrete nature. At these lower levels, visuo-motor coordination, language comprehension, control of attention, ability to understand directions, and the keeping of a direction idea in mind are all important factors which may determine success or failure. With regard to the upper levels, Terman and Merrill ascribe as the reason for the greater number of verbal tests the fact that "At these levels the major intellectual differences between subjects reduce largely to differences in the ability to do conceptual thinking, and facility in dealing with concepts is most readily sampled by the use of verbal tests."

The scarcity of investigations dealing particularly with the lower levels of the Binet scale may be attributable in part to the commonly accepted fact that intelligence tests are less reliable during the pre-school period. The existence of such personality characteristics as negativism, timidity, and distractibility, which traits are more distinctive of the younger than the older child, tends to render test results less valid. In addition to these, other influences more difficult to detect

4 Lewis M. Terman and Maud A. Merrill, Measuring Intelligence, Cambridge, Massachusetts, 1937, 5.
may be operating in the young child. The presence of certain physical factors such as fatigue or hunger, and the absence of such incentives as competition and the desire to do well may be responsible for failure on the part of the child to put forth his best efforts.

Irma S. Black⁵ compared the performances of a group of thirty-one children without nursery school experience with a second group of thirty-five children, who had attended nursery school for at least six months or more, on the Revised Stanford-Binet and Merrill-Palmer tests. With regard to the factors of resistance and shyness, she found these traits less marked in the nursery school than in the non-nursery school child. She attributed the differences in response to the school situation. The school experience, the author reports, tends to give the young child a feeling of security and an ever-increasing confidence in adults, so that the time and effort necessary to establish rapport between the examiner and child are usually reduced to a minimum. With the child less apprehensive, the administration of the test becomes easier and there is the greater likelihood of more accurate results.

In addition to studying the factor of nursery school experience, Black also investigated the reliability of the Revised Stanford-Binet as a pre-school test. After approximately a year she had most of her subjects tested again on both the Binet and Merrill-Palmer scales and found that the correlations on retests were higher on the Binet. Though admitting her sample to be small, the author concluded that the Revised Stanford-Binet is highly stable, and as a pre-school test is more reliable than preceding ones. Likewise, nursery school experience seems to have a lesser effect on the Binet than on the Merrill-Palmer test.

It is intended in the present study to investigate the performance of the mongoloid and pre-school groups on the Goodenough Draw A Man test in addition to that of the Stanford-Binet, and to determine the relationship between these two scales. Because the Goodenough test has high interest value, is easy to administer, and is not time consuming, it has been selected for comparison with the Binet. It is not standardized, however, below the four-year level. With regard to the validity of the Draw A Man test as a measure of intelligence, investigators appear to agree quite generally that it is more valuable as a supplement to the Binet than as an individual test of

6 Ibid.
intelligence. McCarthy7 studied the reliability of the Goodenough and reported that subjective factors in scoring and differences in performance of subjects on retest after only short periods of time indicate the need for care in the use of the scale as an independent measure.

As to the differences in performance of normal and subnormal children on the Goodenough test, there is some agreement by investigators that normal children tend to produce drawings with correct proportion, and which give evidence of the ability to determine proper relationships. The mental defective, on the other hand, shows a lack of this ability by his less integrated performance; though he does better than the former in presenting details, and in body length.8 Because of the low mental age level of the subjects with which the present study will deal, these differences, however, may not be very evident.

Correlation studies of the New Revised Stanford-Binet and the Goodenough Draw A Man test appear to be few in number.


Gelolo McHugh\(^9\) in 1945 made a review of the literature and found no investigations dealing with the relationship between the two tests. From his own study of the performance of ninety subjects on both scales, he reported that the correlations for mental ages as well as for intelligence quotients did not agree well with those obtained by Goodenough on the Draw A Man test and the 1916 revision of the Binet. McHugh was of the opinion that the differences in results may have been due to his use of the two forms of the Binet scale.

In summary, the present study will include the investigation of the mental status of a group of mongoloid children, and the comparison of their performance on the Revised Stanford-Binet and Goodenough Draw A Man test with an intellectually normal group with nursery school experience and of the same mental age. Successes and failures on the Binet will be noted for each group, and the separate items on both scales analyzed to determine any consistent patterning. Finally, the relationship between the Binet and Goodenough tests will be evaluated.

CHAPTER II

REVIEW OF RELATED LITERATURE

1 Clemens E. Benda, *Mongolism and Cretinism*, reviews several past studies dealing with the mental status of the mongolid. Examining their conclusions, he states that L.G. Tennies found most of his subjects to be in the low imbecile group; J.E. Wallace Wallin, who investigated two separate groups, obtained Binet ages from 2 years to 7-8 and 2-6 to 6-8 respectively; M. Kuenzel reported a range from 1 year to 7; and C. Pototsky, though admitting his sample to be a biased one, obtained the highest results with mental ages up to 10-8 on twenty-one cases of mongolism at the Bancroft school. Where these higher mental ages are found, Benda relates that these studies have been with mongolid adults.

Of the above investigators, Wallin\(^2\) appears to be most thorough in reporting his data. In his study, he em-

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ploys the term mongol in reference to patients with at least three or four of the physical signs of mongolism and the term mongoloid to those with only one or two of these signs. Though the children used in the present study have at least three or four of these characteristics, the term mongoloid has been selected as most appropriate. This choice is in agreement with that of Benda, who prefers the term because of the mongol-like appearance of this type of mental defective. He objects to the terms mongolian or mongol because of their specific application to the Mongolian race and the natives of Mongolia.³

Wallin⁴ compares his findings on two groups of mongoloids who had been examined in psycho-educational clinics with those obtained by Pototsky and Grigg. The former's study of St. Louis cases included twenty-three patients ranging in Binet ages from 2 years to 7-8, with a mean of 4-0, and having IQ's from 19 to 63 with an average of 36.2. The mental ages of Wallin's Ohio group of twenty-six subjects were from 2-6 to 6-8 with a mean of 3-6. For this group the IQ's ranged from 19 to 53 and averaged 37.1. From their study of twenty-one cases of mongolism at the Bancroft school, Pototsky and Grigg reported mental ages from 2-9 to 10-8 and a mean of 6-4. The

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³ Benda, Mongolism and Cretinism, 5.
Iq range was from 24 to 71 and averaged 46.4. The mean life age of the St. Louis group was 11-7, the Ohio group 9-10, and the Bancroft group 21-6. From the above data, Wallin concludes that his findings are more in agreement with those of other investigators than are those of Pototsky and Grigg. He believes that the Pototsky differences may be due to the factors of "selective admission into the school"; to the inclusion in the study of slight cases of mongolism, that is, of individuals displaying only one or two mongoloid characteristics, or to the maturity of the Bancroft subjects.

As to Pototsky and Grigg's reference to a selective factor in admissions into the Bancroft school and also into other special schools, Wallin questions this statement; for he asserts that ordinarily it is the lower grade mental defective that is excluded from regular grades or special classes of public schools, and therefore is more apt to be in attendance at private schools. Though some schools may refuse admittance of all mongoloids because of their belief that this type of mental defective is uneducable, Wallin states this was not the policy in the special education departments under his direction. He reported 67 was found to be the highest Binet Iq amongst fifteen thousand patients examined in five psycho-educational clinics.
Benda reports an investigation of 132 mongoloid patients in a state institution. Although the majority of subjects fell within a mental age range of about two and one-half to three and one-half years, the author does not feel that the study is representative of all mongoloids, for it fails to take into account their "social maturity." Along with other investigators, Benda observed that the social rating of mongoloids tends to be higher than their mental age. Also, when they receive individual care or reside in small groups in special schools, they develop better than those who live in large institutions, where no particular attention can be given to their specific needs. From his numerous investigations dealing with mongolism, Benda relates that mongoloids as compared to other types of mental defectives possess different character and psychological traits. Despite the fact that mental development is extremely slow, nevertheless, he states it can be expected to continue in the period from the ages of ten to twenty years. For this reason, he suggests that training should not be stopped too soon. For children under ten years, Benda reports the highest mental age is generally about five years.

5 Ibid.
6 Benda, Mongolism and Cretinism, 58-60.
The study by Rautman of the relative difficulty of the subtests of the Revised Stanford-Binet, Form L, includes the lower levels of the scale. From institutions for mental defectives, he examined the performance of one thousand subjects with Iq's below eighty. To determine the relative difficulty of the subtests, percentages were computed for the number of individuals passing each item, and comparisons were made within each level, from year II through year XI. Besides investigating the performance of the entire group, Rautman divided his subjects into groups of about the same mental age but differing in chronological age, describing these as a "younger," a "middle," and an "older" group. His purpose, in addition to studying the comparative difficulty of items, was to examine the effect of life age on the various tests within the separate levels.

With regard to his conclusions, Rautman reported that his order of difficulty did not coincide with that of the standardized Binet test. Those items at the lower levels which he found to be more difficult for his subjects were: Identifying parts of the body, Identifying objects by name, Identifying ob-

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jects by use, Picture memories, Response to pictures I, Picture completion, and Memory for sentences. As to the influence of chronological age upon performance, the author found that differences were more statistically significant beyond year VI. There were slight indications at the lower levels, however, that the younger group did better in Repeating digits and Picture completion, whereas older subjects were superior in Comprehension II, Picture vocabulary, and Definitions. Life age and experiences, according to the author, do appear to have an influence upon performance on these "more verbal tests." 

Along with Rautman, it appears to be a rather currently accepted view that the differences in performance of mental defectives and of normal individuals of equal mental age on various items of standardized intelligence tests can be explained by the factor of past experience and life age. This hypothesis and the one held by Kounin that there is greater rigidity in the behavior of the older mental defective than in the younger normal child were tested objectively by Thompson and Magaret. 

In the first phase of their investigation, Thompson and Magaret studied the successes and failures of a mentally

8 Ibid.

defective group as compared to those of a control group, composed of 1326 subjects of the standardization group for the 1937 Revised Stanford-Binet scale. The groups were so arranged that the test responses of the defectives of any given mental age could be compared to those of the normal group at the same level. The defective group consisted of 441 subjects ranging in chronological age from four years, six months, to sixteen years, five months, with mental ages from 2-6 to 10-5, and an IQ range of 20 through 79.

By means of chi square evaluation, thirty of the seventy-three items which could be examined by this method were reported to be significant. To satisfy the criterion of significance, a probability figure of .01 or less was required. Eleven of the thirty items were found to be easier for mental defectives and eighteen were more difficult; one item at year VIII, Wet fall, was rated as easier for the younger than the older defective. At the lower levels of the Binet, subtests which met the above criterion and were listed as easier for defectives than for normals of equal mental age were the following: Stringing beads, Drawing a circle, Folding a triangle, Drawing a square, Vocabulary, and Bead chain. Those items more difficult for defectives were: Identification by name, Three digits forward, Identification by use, Sentence memory I, Four digits forward, and Picture comparison.
The authors compared their findings with those of Laycock and Clark, who examined the successes and failures of forty pairs of old-dull and young-bright subjects of matched mental age on Form L of the Revised Stanford-Binet scale. With regard to fifteen items the differences in performance of mental defectives and normals were in the same direction in both investigations, but because of the small number of subjects and the narrow mental age range employed in the Laycock and Clark study, seven items could not satisfy the criterion of significance set up by Thompson and Magaret. In both studies rote memory items were reported as more difficult for defectives than normals.

In the second phase of their study, Thompson and Magaret tested two hypotheses. They had one of the authors of the Binet and a skilled examiner rate all the items of the Revised Stanford-Binet scale, Form L, from year II-6 through year XIV as to their dependence upon past experience, and again as to their dependence upon rigidity, according to Kounin's

10 Samuel R. Laycock and Stanley Clark, "The Comparative Performance of a Group of Old-Dull and Young-Bright Children on Some Items of the Revised Stanford-Binet Scale of Intelligence, Form L," *Journal of Educational Psychology*, XXXIII, 1942, 1-12.

definition of the term. Thompson and Magaret applied the averaged ratings of these Binet items to the eleven items which were found to be easier for their mental defective group and the eighteen items which were more difficult. The differences between the mean ratings for the easier and more difficult items were not statistically significant nor were they in the expected direction for either of the above assumptions.

Because of the lack of evidence supporting these two hypotheses, the authors present a third explanation, suggested by McNemar's factor analysis of the Revised Stanford-Binet scale. "Are the items which differentiate the defectives from the normals those which are saturated more heavily with the general, first factor obtained from a factorial analysis of the scale?" Thompson and Magaret tested this hypothesis by obtaining factor loadings for the various Binet items and comparing the average loadings for the easier and more difficult items for their defective group. They found the difference to be both significant and in the expected direction. The value of $t$ in this case was 2.79.

Interpreting the above obtained difference, the authors report that, since both chronological age and intelligence quotient are variables, the failure of mental defectives on items heavily loaded with the general factor may be due either to the fact that these subjects are older than the nor-
mals of matched mental age or to the fact that their IQ's are lower. Though Thompson and Magaret admit no definite conclusions can be drawn on the basis of McNemar's study, they feel there is an increase of factor loadings with IQ and for this reason assume that "it would follow that the variable accounting for the differential successes and failures of defectives and normals of equal mental age is "brightness" or "general intelligence" or whatever it is that the IQ measures." 12 They suggest the need for future research in factorial analysis of mental defectives, and for the verification of commonly accepted assumptions with investigations employing large numbers of subjects.

Sloan and Cutts 13 report the conclusions from several studies dealing with the comparative difficulty of items on the Binet. They relate Martinson and Strauss' findings that normal children surpass mental defectives on tests requiring verbal reasoning ability while the latter do better on items which involve life experiences. Also, they state that the comparisons by Laycock and Clark of young-bright and

12 Ibid., 292.

old-dull children show that the former perform somewhat better on tests of immediate memory, whereas the old-dull appear to do better on vocabulary and abstract words.

In their own study, Sloan and Cutts investigated the test patterns of 406 mental defectives at the Lincoln State school on the Stanford-Binet, Form L, in the mental age range of four to thirteen years. Using the ratings of "hard" and "easy," they reported as "hard" items: Verbal absurdities, Sentence memory, Opposite analogies, Memory for digits, Rhymes, Similarities, Minkus completion, and Dissected sentences. Definitions, Vocabulary, Picture absurdities, Counting, and Bead stringing were rated as "easy" items for their subjects. Though many of these tests are at levels above those which will be covered in the current study, they give indications that mental defectives tend to be more successful where a situation is presented in a concrete manner, and are less apt to succeed when dealing with abstract concepts. As to the rating of Definitions and Vocabulary as "easy" items for mental defectives, the authors call attention to the fact that these tests, though they seem to be "verbal," do not involve the type of verbal abstraction that is required in many of the "hard" items. 

14 Ibid.
McHugh's investigation of the relationship between the Goodenough test and the 1937 revision of the Stanford-Binet included forty-three boys and forty-seven girls having a mean CA of 64 months and SD 3.97 months. For these ninety kindergarten children, he obtained a positive $r$ of .45 between mental ages and a positive $r$ of .41 between IQ's on the two scales. His results are not in close agreement with those of Goodenough, who, for ninety-four subjects five years of age, reported a positive $r$ of .70 between mental ages obtained on the Goodenough and the 1916 Binet, and a positive $r$ of .74 between IQ's for 334 children within the age range of four to ten years. McHugh suggests that the differences in their results may possibly be due to his use of both forms of the 1937 revision of the Binet.

The correlations of a number of investigators who made comparisons between mental ages of mental defectives, as obtained on the old Binet and the Goodenough scales, are recorded by Judith Israelite in her study dealing with the relative difficulty of items on the Goodenough. She reports that Clemens

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15 McHugh, "Relationship between the Goodenough Drawing a Man Test and the 1937 Revision of the Stanford-Binet Test," *Journal of Educational Psychology* XXXVI, 119-124.

found an r of $0.70$ on his one hundred defectives, McKelwee a $0.717$ for forty-five cases, Yepsen a $0.60$ for thirty-seven defectives, and Earl a $0.48$ on 113 adults. Her own study yielded an r of $0.71$, which correlation agrees favorably with Goodenough's findings of $0.763$ for 334 cases.

The main purpose of Israelite's study was to determine qualitative differences on the Goodenough Draw A Man test and to note whether these differences agreed with those reported by Earl. The latter compared the performance of 113 mental defectives, sixteen to forty years of age, and ranging in mental age from five through nine years, with normal children of the same mental age. He found that mental defectives include a greater number of details in their drawings, whereas the drawings of normal individuals tend to have correct proportion and are better integrated. 17

Israelite included in her investigation 256 patients in a state institution, ranging in life age from six years, three months to forty years, and with Binet mental ages from four through nine years. For her normal group, she applied Goodenough's findings. Though there was disagreement on some items, in general her results support Earl's conclusions. She, too, found that defectives are superior in representing detail,

17 Ibid., 495.
while normals make drawings with better proportion. For the latter group, motor coordination was likewise better. Reporting specifically on the mental age level of 4-0 to 4-11, Israelite states that the mental defectives "were generally either equal to or poorer than the normals of the same mental age." 18

Apart from the studies of the mental status of the mongoloid, all of the above investigations deal with mental defectives as a whole, without any differentiation as to type of mental deficiency. Though there is some disharmony in the specific findings of many of the related studies, which disagreement is due in part to differences in procedure, nevertheless, some broad generalizations may be drawn from these investigations regarding the performance of mental defectives and normals on standardized intelligence tests. The greater success of the former on items dealing with concrete situations, and the superiority of normals on items requiring verbal reasoning ability have become commonly accepted facts. As to published studies treating particularly of the responses of mongoloids as compared to those of normal children of pre-school age, none was found dealing with either the Revised Stanford-Binet or Goodenough scales. Though the number of individuals employed in the current study is small, because of the lim-

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18 Ibid., 497.
ited number of available subjects, a review of the literature indicates the need for further research with larger groups, with different etiologic groups of mental defectives, and with more comparable methods of procedure.
CHAPTER III

PLAN AND PROCEDURE OF THE STUDY

The subjects of the present study were a group of thirty mental defective girls with the diagnosis of mongolism, and a second group composed of thirty intellectually normal children with nursery school experience. All members of the mongoloid group were within the chronological age range of six years, three months and eleven years, four months. They comprised almost the entire population of mongoloids within this age range attending St. Mary of Providence school. With the exception of four, all were resident pupils. Though the diagnosis of mongolism is made before entrance into the school, yet observations were made so that at least three or four of the characteristic signs of this type of mental deficiency were present. Indicated most readily were the almond-shaped eyes, the small nose and flat nasal bridge, fissured tongue, deep voice, and broad hands with short fingers. A few mongoloids at the lower end of the above CA range were eliminated, because speech was so indistinct that no valid score could be obtained on the Stanford-Binet scale.
The thirty normal female children were drawn from six Catholic day nurseries and social centers in the Chicago area. Because the purpose of the present study was to compare the performance of two groups of equal mental age, the normal group could not be selected until most of the mongoloids had been tested. The mental ages of the defectives as obtained on the Revised Stanford-Binet scale, Form L, were listed, and normal subjects with chronological ages approximating these mental ages were then chosen. Some difficulty was encountered in finding a sufficient number of normal children in nursery schools in the life age range of about two and one-half years to three years, three months. Eliminations had to be made among this group also, either because the intelligence quotients obtained on the Binet test did not fall within the broad average range of 85 to 115, or because the mental ages did not match with those of the mongoloid group.

The socio-economic status tends to be somewhat higher for the mongoloid than for the normal group. As to occupational status, more parents of the former group had either a professional or semi-professional rating. Though there was a wide representation of nationalities amongst both groups, there was a preponderance of subjects of Polish and Italian extraction amongst the normals. There was no significant weighting
of any nationality of descent with the mongoloid group. The small number of available subjects due to the limitations set up by the employment of individuals with a specific type of mental deficiency and of normal children with nursery school experience made it somewhat difficult to control the above factors.

The Revised Stanford-Binet scale, Form L, and the Goodenough Draw A Man test were administered to all subjects. Though the authors of the 1937 revision of the Binet suggest beginning the examination at a level just below the chronological age of subjects supposedly of about average ability, testing was begun in almost every case at year III. The only exceptions were a few children under three years of age. Since a large number of normal subjects were just over three years of age, the above suggestion was carried out for the most part. Year III was selected as the desired starting point because the first subtest, Bead stringing, appeared to be a valuable item for establishing rapport. In instances where the subjects appeared to be very shy or resistant, the examiner introduced several pictures of a little girl and some puppies to help the child forget herself and to gain her confidence. But in the majority of cases this procedure was not necessary, and the examination was begun almost immediately with the bead stringing. Because of the apparent enjoyment that most subjects
displayed, they were permitted to continue to string beads after the time limit had been reached and the number strung recorded. As the child continued to string, conversation was encouraged so as to build up rapport. Generally this procedure was found to be quite effective. With the mongoloids, testing was begun at year III, likewise. Here little time was needed to produce rapport, since the examiner was already acquainted with these subjects.

During the examination, when the tests became more difficult or where the subject showed signs of restlessness, a short interruption was permitted. Upon returning to the testing room, the examiner began at year II, and after completing year II-6, proceeded to the higher levels yet to be considered. Though the original intent was to conclude the Binet test when the subject had failed one complete level of subtests, this procedure was not followed; for it was found, especially amongst the mongoloid group, that often successes were earned beyond one level of failure.

Little difficulty was encountered in understanding the speech of the normal children. With the defective group, the speech factor was more significant. In subtests where only a one-word response was required, such as in Picture vocabulary, no difficulty was met with; but in other verbal
tests where a definition or statement was given, occasionally the responses of this latter group were not understood. In all such cases, the item was scored a failure.

The Goodenough test was administered upon the completion of the Binet scale. Since the test was given individually, the wording of the directions was as follows: "Now, I want you to make a picture of a man. Make the very best picture of a man that you can." If there were peculiarities in the drawing or if the child merely drew a straight line or a circle in response to the above directions, she was asked if she would like to make another drawing. To avoid perseverative copying, either the reverse side of the paper was used or a second sheet presented. The same directions as above were then given, and the better picture of the two was credited.

In no case was there any objection to drawing a man or to making the second picture. The Goodenough test was found to be easy to administer, and though presented late in the testing period, all subjects appeared to enjoy the performance. Many of the children named the various items as they drew, but where this was not done, and an item was questionable, the subject was asked to tell about her picture. In most instances, it was necessary for the examiner to point to the various markings and ask what they were, in order to
elicit a response.

Though no child displayed negativism toward the Draw A Man test, it was encountered occasionally with the repetition of digits and some verbal items of the Binet. This behavior was more characteristic of the normal than of the mongoloid group, although with the latter the negativism was more difficult to overcome. Resistance to repeating the digits was broken down quite readily with the normals by introducing the pictures of the little girl or puppies, and suggesting to the child that she tell the little girl or dog to say them. With regard to the dog, a few subjects stated that he could not talk; but despite this fact they were amused with the idea and responded. In two cases, where refusals were still encountered, the repetition of the three digits at year III was secured by introducing this item immediately after the child repeated the two digits at year II-6.

To record the findings on the Binet examination, a separate sheet with all the items of the scale listed from year II through year VI was drawn up for each group. Upon the completion of each individual test, the successes and failures were entered on the above sheets, along with the obtained mental age and intelligence quotient. The same procedure was followed with the Goodenough Draw A Man test, though only those items were listed which one would expect to find in the drawings of small
children.

After all the subjects from both groups were examined, and their successes and failures on the subtests of the Binet recorded, the sum of the successes was tabulated for each item. For comparative purposes, a table was set up, upon which were listed all the items of the Stanford-Binet scale from year III through year V. Year II and year II/6 were eliminated because all subjects of both the mongoloid and normal groups were successful on almost every item at these lowest levels. Moreover, because of the few successes earned at year VI, this level, too, was omitted from the study.

For each of the items listed in the above table, the total number of subjects was recorded, and the number from the respective groups who passed or failed the item entered. From this table the performance of the mongoloid group as compared to that of the mentally normal group could be examined, and then evaluated by the chi square test. By means of this statistical procedure the significance of the difference in the number of mongoloids and normals passing or failing each subtest could be determined.

Because of the small sample, Yates' correction for continuity had to be employed in a number of cases. For four-
fold contingency tables, McNemar states that the correction should be used wherever an expected frequency is less than five, and considers it wise to apply it in all tables where there is an expected frequency less than ten. In the present study, the latter procedure was followed. The use of this correction effects a reduction in the size of chi square. As the criterion of significance, a probability figure of five per cent was set up; this figure may be interpreted as meaning that the chi square at this confidence level could be obtained by chance in only five out of one hundred times.

With regard to the Goodenough Draw A Man test, the various items which had been recorded were totaled also, and these sums then listed on a separate sheet in the same manner as with the Stanford-Binet. Comparisons could thus be made of the performance of the two groups on the drawing test. The same statistical procedure as previously described was applied in determining the significance of the differences here, but because of the immaturity of the subjects, the number of items scored was too small in many cases to permit evaluation by the chi square technique. The criterion of significance again was set at the five per cent level.

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Correlations were made between the mental ages obtained on the Revised Stanford-Binet, Form L, and the Good-enough test for both the defective and the normal group. The coefficients were computed by applying the formula for a Pearson product-moment coefficient. To estimate the significance or confidence level of these coefficients of correlation, the Pearson r's were converted into their corresponding z's by the use of Fisher's table. The standard error of z was found, and the t score derived by dividing z by this obtained standard error. The significance of each coefficient was then determined by referring to the table of t for the number of subjects, equaling thirty in each case. In addition to correlating mental ages, the relationship between intelligence quotients yielded by the two scales was determined also by the application of the above formulas.
CHAPTER IV

PRESENTATION AND ANALYSIS OF THE DATA AND INTERPRETATION OF THE RESULTS

An analysis of the data pertaining to the mental status of the mongoloid group indicates that the results obtained in the present study are in harmony with the findings of most of the related investigations reviewed in Chapter II. In Tables I and II on page 36, the information relative to life age, mental age, and intelligence quotient is summarized for both the mongoloid and the normal groups. The mean, S.D., and range in both MA and IQ as yielded by the Revised Stanford-Binet, Form L, and the Goodenough Draw A Man test are recorded on the separate tables.

The average of 3-7 in Binet MA for the thirty mongoloid subjects is in fair agreement with the mean MA's of 4-0 and 3-6 reported by Wallin 1 for his St. Louis and Ohio groups, respectively. The corresponding averages in IQ for his two groups were 36.2 and 37.1. The mean IQ of 39.9 ob-

tained on the Stanford-Binet in the current study is slightly higher than Wallin's figures; which differences may be due to the restricted CA range employed in the present investigation. Though he does not record the CA range for his St. Louis group, Wallin reported a range of 4-1 to 14-4 for the Ohio group. The mean life age was 11-7 and 9-10 for the St. Louis and Ohio subjects, respectively.

The majority of the mongoloids in the current study are resident in a special school; nevertheless, the results do not confirm the findings of Pototsky and Grigg\(^2\) on their Bancroft group. They reported a mean MA of 6-4 with IQ's averaging 46.4 for their twenty-one subjects. Here again the differences may be due to the age factor; for the mean life age of 21-6 of the Bancroft subjects was very much higher than the average of 9-3 for the defectives in the present study. Pototsky and Grigg reported IQ's up to 71 for their group, though Wallin\(^3\) in the examination of fifteen thousand subjects in five psycho-educational clinics found the highest IQ re-

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corded to be 67. In the present study, a Binet IQ of 61 was obtained. The MA of 5-0 as the uppermost point of the range, moreover, confirms Benda's statement that the highest mental age for mongoloid children under ten years is usually about five years.

From the above it may be concluded that the results of the present study corroborate the findings of the more recent investigators who report that mongoloids on the average have a higher mental capacity than that of the idiot or low grade imbecile. Many of the older studies placed this type of defective in these lower mental categories, so that the label of "mongolian idiocy" is often found in the literature. Though this inaccurate description still appears in current readings, its occurrence is less prevalent than heretofore.

The normal group was matched in mental age with the mongoloid subjects. With the elimination of children with IQ's below 85 and above 115, the Stanford-Binet scale yielded a mean IQ of 103.6 for these thirty subjects with nursery school experience. They ranged in life age from 2-6 to 4-9 with an average of 3-6.

### TABLE I

The mean, S.D., and range of the CA's, MA's, and IQ's as obtained on the Revised Stanford-Binet, Form L

<table>
<thead>
<tr>
<th></th>
<th>Mongoloid group</th>
<th>Normal group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>S.D.</td>
</tr>
<tr>
<td>CA</td>
<td>9-3</td>
<td>18.4 mos.</td>
</tr>
<tr>
<td>MA</td>
<td>3-7</td>
<td>6.8 mos.</td>
</tr>
<tr>
<td>IQ</td>
<td>39.9</td>
<td>7.4</td>
</tr>
</tbody>
</table>

### TABLE II

The mean, S.D., and range of the CA's, MA's, and IQ's as obtained on the Goodenough Draw-A-Man Test

<table>
<thead>
<tr>
<th></th>
<th>Mongoloid group</th>
<th>Normal group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>S.D.</td>
</tr>
<tr>
<td>CA</td>
<td>9-3</td>
<td>18.4 mos.</td>
</tr>
<tr>
<td>MA</td>
<td>4-0</td>
<td>9.0 mos.</td>
</tr>
<tr>
<td>IQ</td>
<td>44.4</td>
<td>8.6</td>
</tr>
</tbody>
</table>

As to the comparison of the performance of the two groups on the Binet with their performance on the Goodenough Draw-A-Man test, it was observed that both mongoloid and normal groups obtained higher mean MA's and mean IQ's on the draw-
ing test. For the mongoloids the Goodenough yielded a mean MA of 4-0 and an average of 44.4 in IQ, and for the normals a mean of 3-9 in MA and of 107.3 in IQ. The majority of the defectives earned higher IQ's on the Goodenough, whereas approximately one-half of the normals did more poorly on the drawing test than on the Stanford-Binet. Nevertheless, the mean IQ of the latter group was higher on the Goodenough than on the Binet. The range in IQ for the nursery group was from 70 to 167 on the drawing test as compared to 89 to 115 on the Binet, with standard deviations of 18.7 and 7.2 respectively. The standard deviations in IQ for the mongoloid group were 8.6 on the Goodenough and 7.4 on the Binet. It appears that the greater inconsistency in performance of the normal group on the drawing scale may perhaps by explained by the factors of life age and experience; for it was noted that more of the normal subjects made drawings of mere scribbling, which procedure may indicate lack of motor coordination or meager experience with handling a pencil. Too, the degree of concept development in the very young nursery school children would likewise determine the measure of success.

With regard to the factor of "brightness" or the higher IQ of the normal group, a study of the individual scores shows for the most part a fair correspondence in IQ on the two scales. There were, however, a number of high Goodenough scores earned by persons with an average or low-average Binet rating, such as
the IQ of 167 at the top of the Goodenough range which was obtained by a three-year-old subject with a Binet IQ of 103. Hence, it appears here also that experience is probably the more significant factor in determining success on the drawing test at the low CA levels covered in the present investigation. As was reported earlier in the study, children under four years of age were not included in the final standardization of the Goodenough Draw A Man test.

The study of the relationship between the MA's and IQ's yielded by the Revised Stanford-Binet, Form L, and the Goodenough Draw A Man test for the separate groups was determined by applying the formula for a Pearson product-moment coefficient of correlation. A positive $r$ of .70 for the mongoloid group was obtained between MA's on the two scales and of .76 between IQ's, whereas for the normal group the corresponding figures were a positive $r$ of .64 and of .35 respectively.

The significance of these coefficients was estimated by computing the standard error of the Pearson $r$'s converted into their corresponding $z$'s, and then deriving the $t$ score. Except for the $r$ of .35 between IQ's for the normal group, which figure was significant only at the 10 per cent level, a probability figure of .001 was found for the remaining co-
efficient. Though the sample is small, these findings indicate a better correlation between the two scales with the mongoloid group than with the pre-school normal group.

The above coefficients of correlation for the mongoloids compare favorably with a number of studies of the relationship between the old Binet and the Goodenough test. Israelite,\(^5\) in her investigation of the qualitative differences on the Goodenough scale, reported the results of several earlier correlation studies. The positive r's recorded for groups of defectives were: an r of .70 obtained by Clemens; an r of .717 by McElwee; an r of .60 by Yepsen; and an r of .48 by Earl for his adult defectives. For her own group of 256 defectives, Israelite obtained an r of .71. Goodenough had reported for her 334 subjects from ages four to ten years, a positive r of .74 between IQ's yielded by the two scales, and an average correlation of .76 between MA's.

The more recent study by G. McHugh\(^6\) of the correlation between the Goodenough test and the 1937 revision of


\(^6\) McHugh, "Relationship between the Goodenough Drawing A Man Test and the 1937 Revision of the Stanford-Binet Test," *Journal of Educational Psychology*, XXXVI, 119-120.
the Stanford-Binet with ninety kindergarten children agrees less well with the results of the investigations recorded above. He reported a positive r of .45 between MA's and a positive r of .41 between IQ's. The disagreement between his findings and those of Goodenough, McHugh attributes to the use of both forms of the 1937 revision of the Stanford-Binet scale. Goodenough's study had yielded an r of .70 in MA between the drawing test and the 1916 Binet, for her ninety-four five-year-olds.

Though the correlations found for the mongoloid group are not in accord with McHugh's findings, yet the positive r of .64 in MA and of .35 in IQ obtained by the normal group in the current study are somewhat more in harmony with the correlations yielded by McHugh's kindergarten group. The present writer has attributed the greater inconsistency of performance of her normal group on the Goodenough scale to the factors of life age and experience. Her nursery school children had a mean CA of 3-6, whereas the mean of McHugh's kindergarten group was higher. Their mean CA of 64 months placed them within the age grouping of four to ten years, upon which levels the drawing test was standardized. As reported above, McHugh suggests that his lack of agreement with previous results may be due to his use of the two forms of the Binet.
In addition to determining the correlation between the Revised Stanford-Binet, Form L, and the Goodenough Draw A Man test, the successes and failures of the mongoloid and normal groups on the various subtests and items of the above scales were examined and evaluated. As to the comparison of the present findings on the Binet with those reported by earlier investigators, some differences can be noted with regard to specific items, but, in general, the results tend to confirm previous findings that defectives perform better where the situation is presented in a concrete manner, whereas normals of equal mental age are superior on items where some sort of abstraction and reasoning ability are required. However, because of the limited number of subjects, the differences in proportion of mongoloid and normal children passing the various subtests were significant for only a few items. On the Goodenough test only a small number of items were scored, so that no differences between the two groups met the criterion of significance set at the five per cent level.

The comparison of the performance of the mongoloids and normals was determined by means of the chi square technique. As the sample was small, Yates' correction for continuity had to be applied to a number of items. With the elimination of year levels II and II-6 on the Binet, for the reason that all subjects from both groups passed almost every item at these lev-
els, only thirty items were left to be considered for analysis. Though a number of subjects were examined on the six-year level, the number of successes was not large enough to warrant making comparisons between the two groups.

The only significant items secured on the Revised Stanford-Binet, Form L, were: Repeating three digits, Three commissions, Copying a square, and Counting four objects. The first two items were found to be easier for the normals, whereas the latter two were easier for the mongoloid children. Other items on which the normal subjects were superior were: Picture memories, Comparison of sticks, Comprehension I and II, Discrimination of forms, Aesthetic comparison, Repeating four digits, and Definitions. In addition to Copying a square and Counting four objects, the mongoloid group did better in Stringing beads, Copying a circle, Response to pictures I, Picture completion, Pictorial identification, and Folding a triangle. For all of the remaining items the number of subjects passing and failing was almost identical for the two groups. Though Opposite analogies favored the normal group slightly, the difference was not statistically significant. In Table III are recorded all of the subtests of the Binet from year III through year V with their corresponding chi squares and levels of confidence.
### TABLE III

**COMPARISON OF THE PERFORMANCE OF THE MONGOLOID AND NORMAL GROUPS ON THE ITEMS OF THE REVISED STANFORD-BINET, FORM L**

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Name</th>
<th>$X^2$</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>III,1</td>
<td>Stringing beads</td>
<td>2.268*</td>
<td>.70</td>
</tr>
<tr>
<td>5</td>
<td>Copying a circle</td>
<td>2.586*</td>
<td>.20</td>
</tr>
<tr>
<td>III-6,4</td>
<td>Response to pictures I</td>
<td>1.150</td>
<td>.30</td>
</tr>
<tr>
<td>IV,3</td>
<td>Picture completion(V,1 P = .80)</td>
<td>1.072</td>
<td>.30</td>
</tr>
<tr>
<td>4</td>
<td>Pictorial identification</td>
<td>0.271</td>
<td>.70</td>
</tr>
<tr>
<td>V,2</td>
<td>Triangle-Paper folding</td>
<td>0.355*</td>
<td>.70</td>
</tr>
<tr>
<td>4</td>
<td>Copying a square</td>
<td>5.104*</td>
<td>.05</td>
</tr>
<tr>
<td>6</td>
<td>Counting four objects</td>
<td>7.546*</td>
<td>.01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Name</th>
<th>$X^2$</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>III,4</td>
<td>Picture memories</td>
<td>1.072</td>
<td>.30</td>
</tr>
<tr>
<td>6</td>
<td>Repeating three digits</td>
<td>10.336</td>
<td>.01</td>
</tr>
<tr>
<td>III-6,3</td>
<td>Comparison of sticks</td>
<td>0.817</td>
<td>.50</td>
</tr>
<tr>
<td>6</td>
<td>Comprehension I</td>
<td>3.270</td>
<td>.10</td>
</tr>
<tr>
<td>IV,5</td>
<td>Discrimination of forms</td>
<td>0.383*</td>
<td>.70</td>
</tr>
<tr>
<td>6</td>
<td>Comprehension II</td>
<td>0.934*</td>
<td>.80</td>
</tr>
<tr>
<td>IV-6,1</td>
<td>Aesthetic comparisons</td>
<td>0.267</td>
<td>.70</td>
</tr>
<tr>
<td>2</td>
<td>Repeating four digits</td>
<td>0.873*</td>
<td>.50</td>
</tr>
<tr>
<td>5</td>
<td>Three commissions</td>
<td>11.819*</td>
<td>.001</td>
</tr>
<tr>
<td>V,3</td>
<td>Definitions</td>
<td>0.278</td>
<td>.70</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>III,2</td>
<td>Picture vocabulary (III-6,2; IV,1)</td>
</tr>
<tr>
<td>3</td>
<td>Block building-Bridge</td>
</tr>
<tr>
<td>III-6,1</td>
<td>Obeying simple commands</td>
</tr>
<tr>
<td>5</td>
<td>Identification of objects by use</td>
</tr>
<tr>
<td>IV,2</td>
<td>Naming objects from memory</td>
</tr>
<tr>
<td>IV-6,3</td>
<td>Pictorial likenesses and differences</td>
</tr>
<tr>
<td>4</td>
<td>Materials</td>
</tr>
<tr>
<td>6</td>
<td>Opposite analogies</td>
</tr>
<tr>
<td>V,5</td>
<td>Memory for sentences</td>
</tr>
</tbody>
</table>

*The starred items were those to which Yates' correction was applied.*
The success of the normal group on memory items is in agreement with the findings of more recent studies which demonstrate the superiority of normal children over defectives in this sphere. With repetition of digits, besides memory span, it appears that the ability to understand directions, and attention, were also factors which determined success or failure. For it was observed that instead of repeating the series, a number of the mongoloid group responded by giving a single number. This performance may indicate that the subject had the impression that the examiner was requesting a sum. Occasionally, too, individuals from both groups would repeat the separate digits immediately after the examiner. When it was suggested that the subject say them again, the normals more frequently than the mongoloids responded by giving the series. The smaller differences in proportion of successes and failures on rote memory items at the upper levels of the Binet covered in the present study seem reasonable, since fewer successes could be expected of the very young normal children of average mentality as they reached the higher test levels.

The greatest difference in the performance of the two groups was manifested at year IV-6 with the subtest, Three commissions. To keep the three commands in mind long enough to put them into execution was very difficult for the mongo-
loids. A few of these subjects carried out the three commissions in an incorrect order, whereas a larger number merely put the pencil on the chair and then looked at the examiner as if finished or awaiting a further order. Though only two defectives passed this item, fifteen normal subjects succeeded in carrying out the three commands in their proper sequence. The latter group appeared to have an appreciation of the game-like nature of the test and was enthusiastic about executing the commands, while, on the other hand, the mongoloid children apparently had no such awareness. In response to the third request of picking up the box and handing it to the examiner, many of the defectives opened the door and went out of the room to look for a box. Only one normal child did this. In the present study, the command to open the door was given for both groups, though the authors of the Binet permit the use of either opening or shutting a door. It appears that the suggestion of closing an opened door would probably have elicited a greater number of successes for the mongoloid group, since they tended to view the particular test situation as a practical one.

Rautman, 7 in his study of the relative difficulty of

the subtests of the Revised Stanford-Binet, Form L, did not test his subjects on Three commissions, substituting Picture identification; Thompson and Margaret do not list it as a significant item. Perhaps the low mean IQ of the mongoloids, or the particular kind of deficiency may have determined its significance in the current study.

Inasmuch as the two groups were matched in mental age, it appears that the greater success of the mongoloids in Copying a square and in Counting four objects may be attributed to the higher life age and school experience of the defective group. Copying a square requires ability in eye-hand coordinations, which ability, as determined by its placement on the standardized Binet scale, is normally not developed until five years of age. Findings reported earlier in the chapter with regard to the Goodenough Draw A Man test seem to confirm the above; for the comparatively poorer performance of the normal group in drawing the man seemed to be the result of motor incoordination and inexperience with the use of a pencil. As to Counting four objects, which the authors of the Binet list as the most difficult for children of five years, the superiority of the defective group is apparently due to their school exper-

ience. Whereas the mongoloids are given training in number work, counting is not ordinarily a part of the nursery school program.

Granting that the following items did not meet the criterion of significance set up in the current study, nevertheless, the success of the mongolid group in Stringing beads, Copying a circle, and Filling a triangle is in agreement with the findings of Thompson and Magaret.\footnote{Ibid.} Rautman's results are less in harmony with those of the present study, though he, likewise, reported only a few items below the six-year level as being statistically reliable. Both Rautman\footnote{10 Rautman, "Relative Difficulty of Test Items of the Revised Stanford-Binet: An Analysis of Records from a Low Intelligence Group," \textit{Journal of Experimental Education}, X, 188.} and the present writer noted that defectives did better on Pictorial identification, but the latter found that her mongolid group was superior to the normals on Response to Pictures I and Picture completion. Rautman reported these two items as more difficult for his defective group, while Thompson and Magaret did not list them as significant items.

With regard to subtests on which the normals surpassed the mongoloids, both Thompson and Magaret, and Sloan and
Cutts concluded that normals were superior to defectives in the repetition of digits. In the current study, the greater success of the nursery group on Picture memories is in accord with Rautman's findings; but he found that his defectives were superior on Comprehension I and II. The present study revealed these items as easier for the nursery school children. As to Definitions, on which item Sloan and Cutts reported their older subjects did better, the normal group surpassed the mongoloids. However, the difference was not great.

It appears that the lack of agreement on some of the subtests above, as compared to the findings of related studies with defectives, may be ascribed to several factors. Failure of the mongoloids on the items of a more verbal nature may have been effected in part by the difficulty that most of these subjects experienced in expressing themselves, and also may be due to the low mean IQ of this group. Most of the related studies dealing with defectives included subjects chronologically older and with higher mental ratings than those of the children employed in the current study. On account of the immaturity of the nursery school children, it seems that the failure of this group on the more concrete items, such as Picture completion,

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Sloan and Cutts, "Test Patterns of Mental Defectives on the Revised Stanford-Binet Scale," American Journal of Mental Deficiency, LI, 394-396.
may be attributed to motor incoordination and to a lack of concept development.

Studying the nature of the tests on which the mongoloids surpassed the normals in the present study, the majority are of a performance type requiring complicated motor coordinations; so that the success of this group seemed to be determined primarily by the degree of development of motor coordination, and the ability to make use of visual perceptions. For the items on which the normals were superior to the mongoloids, such factors as memory span, understanding directions, and the keeping of a directing idea in mind, were significant. Other than mere rote memory, most of the successes of this group, though relating to perceptual material, involve processes of a more abstract nature than do those items upon which the mongoloids were successful. These conclusions are in agreement with those generally accepted, that defectives succeed better in concrete situations and normals where reasoning ability is required.

In the current study, no investigation was made of the relative difficulty of the subtests of the Stanford-Binet scale within the separate age levels. Rautman and Fleming had investigated these differences, but the present writer believed her number of subjects to be too limited to warrant making like comparisons. However, an observation of the entire number of
successes earned at the separate levels covered in the current study revealed a rather significant fact, in that the total successes at year V for the mongoloid group was considerably greater than that at year IV-6. The larger number of concrete items at year V most probably was the reason for the defectives finding this level easier than year IV-6. With regard to the normal group, there was, as could be expected, a gradual reduction in the number of successes as the examination proceeded to the upper levels.

For the majority of the items on the Goodenough Draw A Man test, the number of successes scored by the mongoloid and normal groups was too small to allow for evaluation by means of the chi square test. The reason for this small proportion of successes may be attributed in part to the limited number of subjects employed in the study, to the immaturity of the normal subjects, and furthermore, to the low mental rating of the mongoloid group.

Of the fifty-one items listed on the Goodenough scale, only eighteen were included in the drawings of the subjects in the present study. The total number of items scored by the separate groups was greater for the defectives than normals, the latter surpassing the mongoloids on only a very few items. The normals seemed to have a slight advantage over the mongoloids in drawing arms, in making the hand distinct from the fingers
or arm, and in showing both the chin and forehead.

The items on which the greater number of subjects from both groups succeeded most frequently were in drawing the outline of the head and in making eyes. The number of successes on these two items was identical for both groups. The greatest difference in the performance of the mongoloids and normals was noted in the drawing of the nose and mouth. More of the defectives drew these two features, but the obtained difference between the groups did not meet the criterion of significance set up at the five per cent level. The chi squares computed for these two items were at the twenty per cent level of confidence.

A larger number of mongoloids than normals drew the trunk and made its length greater than its breadth. Likewise, more defectives produced drawings showing hair, clothing, fingers, and eye detail. With regard to the clothing item, there seemed to be some impression carried over from the Binet scale on the subtest, Picture completion; for the few subjects who were successful on this item tended to draw buttons.

Inasmuch as only eighteen of the Goodenough items were included in the drawings of the present groups, and on many of these only a few successes were earned, no detailed comparisons can be made with the related studies. The previous investigators had concluded that mental defectives are
superior in the number of details contained in their drawings, whereas those produced by normals are more integrated and have better proportion. The present results, though not significant, indicate that the mongoloids represented more details in their drawings than did the normal group. As to the earlier findings that normals make better proportioned and more integrated drawings, these results could not be verified in the current study because of the primitive type of drawings produced by the very immature subjects comprising the nursery school group.
CHAPTER V

SUMMARY AND CONCLUSIONS

The aim of the current study was the investigation of the mental status of a group of female children with the diagnosis of mongolism, and the comparison of their performance on the Revised Stanford-Binet, Form L and Goodenough Draw A Man tests with that of an intellectually normal group, matched in mental age. By studying the successes and failures of the two groups on the various items of the above scales, the writer endeavored to discover any consistent patterning in the performance of the mongoloid children as compared to that of normals. Furthermore, correlations between mental ages and intelligence quotients yielded by the two scales were computed for the separate groups, and the significance of the coefficients estimated.

The total number of subjects examined in the present study was sixty. The thirty mongoloids were between the ages of six years, three months and eleven years, four months; and the thirty normal female children with nursery school experience ranged in age from two years, six months and four years, nine months. With the exception of four subjects, the
mongoloids were all resident pupils of St. Mary of Providence school, whereas the normals were drawn from six Catholic day nurseries and social centers in the Archdiocese of Chicago. The socio-economic status of the defective group appeared to be slightly higher than that of the normal group.

With regard to the 1937 revision of the Stanford-Binet and to the Goodenough Draw A Man test, which is not standardized below the four-year level, comparatively few studies could be found in the literature dealing specifically with the performance of mongoloids or of children at the pre-school level. There were a number of qualitative and a still greater number of quantitative studies treating of the performance of mental defectives as compared to that of intellectually normal individuals, but for the most part these investigations employed subjects chronologically older than those of the normal group in the current study. The review of the literature, moreover, gave evidence that most of the previous correlation studies were between the Goodenough and the 1916 revision of the Binet. The subjects in these earlier studies were likewise older than those considered in the present investigation.

The Revised Stanford-Binet, Form L, and the Goodenough Draw A Man test were administered to all subjects. For comparative purposes, the successes as well as the ob-
tained MA and IQ for each subject were recorded for the separate groups; and by means of chi square evaluation the significance of the differences in the number of mongoloids and normals passing or failing each item was determined. Though all subjects were examined on year levels II and II-6 of the Binet, only the levels from year III through year V were considered for analysis.

The MA's and IQ's yielded by the Revised Stanford-Binet, Form L, for the mongoloid group confirmed the more recent findings that most mongoloids fall within the imbecile classification. In the present study, the range in MA was from 2-8 to 5-0 with a mean of 3-7, and in IQ from 27 to 61 with a mean of 39.9. The figure of 5-0 at the top of the MA range is in accord with Benda's\(^1\) statement that for mongoloids under ten years of age, the highest MA is usually about five years. Moreover, the IQ of 61 at the top of the range is in keeping with Wallin's\(^2\) findings of 67 as the highest IQ amongst fifteen thousand subjects examined in five psycho-educational clinics.

Comparing the successes and failures of the two

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groups on the subtests of the Binet, four items showed a difference significant at the five per cent level. These were: Repeating three digits and Three commissions, which items were easier for the normal subjects, and Copying a square and Counting four objects, which were easier for the mongoloids. Other subtests on which the normal subjects surpassed the defectives to a lesser degree were: Picture memories, Comparison of sticks, Comprehension I and II, Discrimination of forms, Aesthetic comparison, Repeating four digits, and Definitions. Similarly, the mongoloids appeared somewhat superior to the normals in Stringing beads, Copying a circle, Response to pictures I, Picture completion, Pictorial identification, and Folding a triangle.

Considering specific items, the results are not in close agreement with the findings of some of the related studies. Yet, in general, they are in harmony with those investigators who conclude that normals do better on memory items and where processes of a more abstract nature are involved; and defectives do better where a situation is presented concretely. In the present study, motor coordination and the ability to make visual perceptions seemed to be the factors which determined the success of the mongoloids, while the ability to understand directions and to keep a directing idea in mind were of consequence in the success of the normal subjects.

Because of the immaturity of the nursery school
children and the low mental rating of the mongoloids, only
eighteen of a possible fifty-one scorable items of the Good-
ough scale were included in the drawings of the two groups.
Of the few items that could be evaluated by means of the chi
square test, none met the criterion of significance set at
the five per cent level. Nevertheless, though no signifi-
cant differences were found between the two groups, there were
indications that the mongoloids represented more details than
did normals in their drawings. Previous studies had reported
that defectives tend to include more details, whereas the draw-
ings of normal subjects are better integrated and are apt to
have more correct proportions. Because of the crude drawings
made by the very young normal subjects in the current study,
the latter conclusion could not be confirmed.

Both the mongolid and normal groups secured higher
mean MA's and mean IQ's on the Goodenough test than on the
Binet. Though the majority of defectives earned higher IQ's
on the drawing test, approximately one-half of the nursery
school children performed more poorly on the Goodenough, des-
pite the fact that the average IQ for the latter group was
higher than on the Binet. The range in IQ for the normal
group was from 70 to 167 on the Goodenough as compared to 89
to 115 on the Binet; the mongoloids ranged in Goodenough IQ
from 30 to 64 as compared to 27 to 61 on the Binet.
ber of high Goodenough scores were earned by subjects with average or low average Binet IQ ratings. Experience seemed to be the more significant factor in determining success on the drawing test in the present investigation.

In the study of correlations between the Revised Stanford-Binet, Form L, and Goodenough Draw A Man test, the positive r's of .70 and of .78, respectively between MA's and IQ's earned by the mongoloid subjects, are in accord with previous results obtained with the 1916 revision of the Binet and the drawing test. The r's of .64 and of .35 between MA's and IQ's secured by the normal group are less in harmony with the above, but are more in agreement with McHugh's study with ninety kindergarten children of the relationship between the Goodenough and the 1937 revision of the Binet. From a consideration of the above r's, which, with the exception of the r of .35, were significant at the .001 level, there is evidence of a better correlation between the two scales with the defective group than for the nursery school group. However, the latter were chronologically very immature and the majority were not within the standarization level of the scale.

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There were a number of limitations and imperfections in the present investigation, due in part to the small number of subjects studied, as well as to the restrictions raised by the employment of a specific etiologic group, and chronologically young normal subjects with nursery school experience. With the mongoloid group, the matter of indistinct speech and lack of verbal facility may have tended to invalidate test findings, whereas with the pre-school children, though negativism did not seem to play a significant role, there may have been other factors less well demonstrated which may have affected test results. Besides, insufficiently developed motor control and lack of experience in using a pencil on the part of some of the very young normal subjects most probably rendered somewhat less accurate the findings on the Goodenough Draw A Man test.

As to the various phases of the present study, the results, though not significant in all aspects, agree quite generally with the conclusions reported in earlier investigations. For the most part, the present writer has attributed the differences in the performance of her two matched mental age groups on the Binet to the factors of life age and experience in the success of the mongoloids, and to the ability to comprehend directions and to keep a directing idea in mind in the success of the normal group.
Thompson and Magaret, whose study was summarized in Chapter II, objected to earlier investigators assigning the differences in successes and failures of mental defectives and normals of equal MA to the influence of past experience, and thus taking into consideration only the one variable, CA, in studies where IQ is likewise not controlled. They tested the experience hypothesis and also that of rigidity, and finding evidence lacking in support of previous assumptions, tested a third hypothesis suggested by McNemar's factor analysis of the Stanford-Binet scale. Because the results in the last instance were significant and in the expected direction, Thompson and Magaret, though admitting no definite conclusions could be made on the basis of McNemar's study, assumed that the variable which differentiated defectives from normals may be the factor of "brightness" or "whatever it is that the IQ measures".

Inasmuch as the above study was beyond the scope of the current investigation, the present writer drew her conclusions from an examination of the processes and abilities required for a successful performance on various Binet items as


5 Ibid.
explained by Terman and Merrill in *Measuring Intelligence*. The subtests on which the mongoloids surpassed the normals, for the most part, involved motor coordinations and the ability to make visual perceptions, and those where they failed, or on which the normals were superior, required processes of a more abstract nature.

Since the examination covered only the lower levels of the Binet scale, it appears that the factors of concreteness and abstraction or reasoning ability are not as widely differentiated as with the more mature child where mental development has progressed further beyond the perceptual level. Nevertheless, because of the higher thought processes involved in most of the subtests on which the normals surpassed the defectives, the present writer does not feel that the "brightness" or IQ factor has been ignored.

On account of the rapid mental development of the very young normal child, it appears for future consideration, that with larger numbers of subjects available, more significant results might be obtained by including in the study of the comparison of the performance of mongoloids and normals, only subjects of the defective group having MA's matched with

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6 Terman and Merrill, *Measuring Intelligence*, 193-221.
those of a normal group of average mentality, whose chronological ages fall within the span of one year; for example, limiting the normal group to three-year-olds. This procedure would require a larger number of subjects and hence could not be carried out in the current study.

The above may be a suggestion for further research, inasmuch as the present findings and those of related investigations indicate the need for more studies of a similar nature, with specific etiologic groups, with narrowed CA and IQ ranges, and employing larger numbers of subjects.
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II. ARTICLES


Approval Sheet

The thesis submitted by Sister Rosalia Asma, D.S.M.F., has been read and approved by three members of the Department of Psychology.

The final copies have been examined by the director of the thesis and the signature which appears below verifies the fact that any necessary changes have been incorporated, and that the thesis is now given final approval with reference to content, form, and mechanical accuracy.

The thesis is therefore accepted in partial fulfillment of the requirements for the Degree of Master of Arts.

January 17, 1955

[Signature of Adviser]