School readiness and achievement of Crow Indian children, first through fouth grades, at Pryor, Montana
by Joyce Martin Jensen

A thesis submitted to the Graduate Faculty in partial fulfillment of the requirements for the degree of MASTER OF SCIENCE in Education
Montana State University

Abstract:
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The three first graders received scores of "b" on the Readiness Test given in May. For grades two, three, and four, Arithmetic, especially Computation, had the highest scores. Spelling was also high. The lowest scores were in Word Discrimination, Problem Solving and Concepts, and Reading.

The scores on the Gesell Developmental Examination were up to three years behind chronological age. In no case were the scores equal to or higher than chronological age. Few children had notions of such things as birth date, address, date, occupations, and birthday parties. The children were up to three years behind as measured by this test.

The Lowenfeld Mosaic was enjoyed immensely. They worked quickly making a pattern. Only three named their pictures; none discussed what they had done.

On the Piaget tasks, most children understood the task of Counting and had no trouble with it. When classifying Floating Bodies, most children did not understand fully. They were right only a part of the time. Very few children understood Conservation of Water. They based answers on height of water or number of containers. Thus, the children's development was far behind their chronological ages, as measured by these tasks.

Every score rose during the year, although some did not increase very much. Of eighty-seven correlations, twelve were significant. Many of those included one item dealing with English, such as Word Knowledge or Word Discrimination.

This study is a broad, pilot study, serving more as a description than as a study dealing with final, definite conclusions.

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Date Aug. 9, 1969

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By
Joyce Martin Jensen

A thesis submitted to the Graduate Faculty in partial fulfillment of the requirements for the degree

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TABLE OF CONTENTS

Chapter		Page
I.	Introduction	1
II.	Stanford-Binet Intelligence Scale	11
	Description of the Test	11
	Results of the Test	13
III.	The Metropolitan Readiness and Achievement Tests	18
	Description of the Tests	18
	Results of the Tests	23
IV.	Gesell Developmental Examination	29
	Description of the Test	29
	Results of the Test	39
	Thumbnail Sketch	39
	Initial Interview	39
	Paper and Pencil Tests	41
	Copy Forms	42
	Incomplete Man	47
	Grading the Test	49
V.	The Lowenfeld Mosaic Test	50
	Description of the Test	50
	Giving the Test	52
	Norms of the Test	53
	Results of the Test	57
VI.	Selected Tasks from Piaget	61
	Description of the Tasks	61
	Spontaneous Correspondence	63
	Classifying and Ordering Floating Bodies	65
	Conservation of Continuous Quantity	67
	Results of the Tasks	68
	Conservation of Numbers	68
	Classifying and Ordering Floating Bodies	70
	Conservation of Continuous Quantity	72
VII.	Statistical Information	74
VIII.	Summary	80
IX.	Investigator's Opinions	85
	Appendixes	89

A. A Report on Coombs, *et al.* Study of Achievement 90
B. Characteristics of Given Ages on the Lowenfeld Mosaic 93
C. Photographs of Lowenfeld Mosaics 95
D. Correlations 106

Literature Cited 108

LIST OF TABLES

1. The Children in Grades 1-4 at Pryor Public School. 7

2. Basal Age and Ceiling in October and May 14

3. Vocabulary: Number Correct. 15

4. Change in I.Q. Scores. 16

5. Stanines and Percentiles 19

6. Matching Percentiles and Stanines. 19

7. Ranking of Second Grade Scores 25

8. Ranking of Third Grade Scores 27

9. Tests of Each Fourth Grader. 27

10. Color Preferences. 54

11. Order and Number of Colors Used by Each Grade. 58

12. Order and Number of Shapes Used by Each Grade. 58

13. Kinds of Thinking. 65

14. Stages for Each of Piaget's Tasks. 69

15. Significant Correlations 74

16. Tests: Means and Standard Deviations. 77

LIST OF FIGURES

1. Gesell Copy Forms. 34

2. Ways of Making a Divided Rectangle 34

3. Incomplete Man 37

4. How Children at Pryor Made Copy Forms. 44

5. Shapes of Mosaic Pieces. 51

ABSTRACT

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CHAPTER I

INTRODUCTION

Education is important for success in the American world as it now exists. Therefore, every community in our country provides some type of formal education for its young. In some places this formal education is of the highest quality. In other places the quality is much poorer. Some parents support the schools; others ignore them; and still others work against school either consciously or unconsciously. The child is caught in the middle between home and school. Often, the younger the child, the more severely he is caught.

Starting school may or may not be a pleasant experience. If the child is mature enough and capable of doing the work, school will probably be enjoyable. However, if he cannot do the work, school will be very frustrating. Then the child will cause problems, in either aggressive or withdrawn ways.

Many criteria have been used for determining when a child should enter school. The most common criteria now is chronological age based upon birthdate. However, being six does not mean the child thinks or acts like a six-year-old. If he is not as mature as the average six-year-old, school will very likely demand more than he is capable of doing. Readiness is a word used as an expression of maturity. If the child is not ready when he begins school, he may not be ready for any following grade, since each succeeding grade demands increasing maturity.

Innate ability, initial readiness for school, increasing maturity,

and achievement in school will help or hinder a child's progress. For each of these factors, tests have been constructed, validated, and standardized to do the specific job of measuring. Among these tests are the ones used for this study: The Lowenfeld Mosaic Test, tasks from Piaget, the Gesell Developmental Examination, the Stanford-Binet Intelligence Scale, the Metropolitan Readiness Tests, and the Metropolitan Achievement Tests.

Tests show that the above factors may present problems in any group of children. However, in a group of a different culture, they may present grave problems.

Indians have two-thirds life expectancy, one-half to one-third the level of education, less than one-third the income, and seven to eight times as much unemployment as the national average for all Americans.[1] Also, Indians have retained much of their own culture:

> . . .after 300 years of white contact, . . .Indians still maintain a different culture than that of the surrounding non-Indians. While much of the traditional culture has been lost there remains a residue largely expressed in a value system somewhat at variance with that of American culture.[2]

The Indian is thus trying and succeeding in great measure to remain a distinct and separate race. For example, in Montana and Wyoming 80% of the children in mixed schools choose friends of their own race.[3]

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[1]Stone, Veda, "The Indian Child in the Classroom," Journal of American Indian Education, May, 1964, Vol. 3, No. 3, p. 16.

[2]Ibid., p. 17.

[3]Coombs, L. Madison, Ralph E. Kron, E. Gordon Collister, Kenneth E. Anderson, The Indian Child Goes to School, United States Department of the Interior Bureau of Indian Affairs, 1958, p. 8.

Indian children, therefore, are in two worlds. Sometimes they do not know exactly how to make these two worlds match. Education helps the child learn about the white man's world. For many children school is the only formal contact with white man and his world.

For instance, although the children from Pryor, Montana, made trips to Billings and although they watched television, they did not understand much of what they saw and heard. They often asked teachers for explanations. "Is Dean Martin and you sisters?" a child asked his teacher one day. "You have the same last names." Comments like these were often heard: "Why did the lady follow us over the store? We don't steal." "Why do bosteela (whites) make fun of us all the time?" Because of their lack of understanding or their sensitivity, the children often feared and hated the white man's world. Worse, because they were not quite sure of whom or what they were, they often even hated themselves and each other.

To a certain extent one's world view and understanding are controlled by one's language. Often even translation may not help. If the child does not have adequate command of the English language, he will not understand many of the concepts taught in school. The children at Pryor did not have command of English. Also, many of them seemed to have poor command of their own native tongue, Crow. Frequently a child would start to say something in English, then turn to a classmate to translate a Crow work or phrase into English. Occasionally a child would start to say something, then quit because he had no words in either English or Crow.

There is a break between third and fourth grades. Prior to fourth grade, the children's reading vocabulary consists of common, everyday words which comprise about 5% of the English language.[4] In fourth grade the reading vocabulary expands and becomes more difficult. The child with the best command of English has the least difficulty with the transition. Perhaps this explains why Coombs[5] and others found that fourth grade Indian children scored more like white children in the fall than do children at any higher grade level. At that time they are still using common words.

Researchers have also found that Indian pupils in public schools achieved higher than Indian pupils in federal or in mission schools, although they scored much lower than rural white children from the same area. Indians in Montana and Wyoming socred higher than Indians from many other areas. However, they scored considerably lower compared to their rural white neighbors. There was no significant difference between Indian pupils in mostly Indian schools and those in schools which were $\frac{1}{2}$ Indian and $\frac{1}{2}$ white. (See Appendix A.) On the average, Indian children were six months older than white children in the same grade. Those overaged tended to be boys; those at age, girls. Those overaged did not score as high as those at age. Several reasons have been given for Indian children's being older. In many cases, the first year of

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[4]Crater Alice, Annis Flake, Ethel Mills, "Third Graders and Reading Dictionaries," Journal of American Indian Education, Vol. 2, No. 3, (May, 1963), p. 16.

[5]Coombs, and others, op. cit.

school was used to teach the child enough English to succeed in school. Hopefully, Head Start is now fulfilling that role. Because of very irregular attendance, children often repeated grades. Also, many pupils started school late.[6] Indian children compared most favorably with rural whites in spelling and arithmetic fundamentals. They scored least favorably in reading vocabulary and arithmetical reasoning.[7]

Before 1935, studies "proved" that Indians were less intelligent as measured by tests. More recently the Indians were found to have I.Q.'s similar to whites; or any differences were easily explained by language and cultural differences.[8] Intelligence tests have been standardized mainly for white children from urban areas who have facility in English. Many Indians made similar low I.Q. scores as rural children from the same geographic area using the same test.[9] When the school began to fill in the background of the child, his I.Q. rose.[10] These were some findings on Indian children:

(1) Intelligence tests as they presently exist may not be a true indicator of a child's innate intelligence.

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[6]Rossel, Robert A., Handbook for Indian Education, Los Angeles: Amerindian Publishing Company, n,d,p. 63.

[7]Ibid., p. 63.

[8]Ibid., p. 57

[9]Beatty, Willard W., ed., Education for Cultural Change, U. S. Department of the Interior Bureau of Indian Affairs, 1953, p. 502.

[10]Ibid., p. 500.

(2) Intelligence tests may be culturally biased in favor of white, middle class children to the extent of over 20 I.Q. points.
(3) Verbal items on an intelligence test are the most difficult for the low status children.
(4) Intelligence tests can be used to predict educability within the narrow limited concept practiced by schools today.
(5) Many children are penalized because their culture precludes their possessing the knowledge necessary to succeed at school.
(6) Motivation is not everywhere the same and constant but varies.[11]

It is believed that Indian children score lower on both achievement and I.Q. tests than white children for two main reasons, language and environment. For most Indian children, English is a second language, not the first. Also, most of these children are from rural communities isolated from the dominant white communities. No wonder children often have difficulty in the white man's school. It is not geared to them.

Because very little has been done with primary grades, this present study was made in grades one through four. Many facets of the child were tested. During the year, the teachers tried many things to broaden the child's environment and to aid in his growth and development. The children were tested again. Few studies of this kind have been done with Crow Indian children, especially at lower grade levels. Before teachers can effectively teach Crow Indian children, they need to know the level of the children and the capabilities. Hopefully, this study

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[11]Rossel, op. cit., pgs. 65-66.

will aid teachers in better understanding their pupils. Perhaps, too, it will have suggestions to better prepare them to consider how to teach these children from a different culture, which is based on a proud heritage of brave people.

This study originated from a full year's work with children of the Pryor Public School at Pryor, Montana. This school is on the Crow Indian Reservation in southeastern Montana.

During the school year 1967-1968, the school included fifty-one pupils in grades one through eight and in the Special Education Class. Nearby were the Head Start classes. The school was divided into classes in blocks of two grades per room. There were four teachers for the eighth grades. A fifth teacher taught the Special Education Class. Except for Special Education, there were between ten and thirteen pupils in each room. The Public School contained slightly under one-half of the children of this age range. Most of the rest went to the Catholic mission school, St. Charles. Only the first four grades were used for the testing done for this study. There was a total of twenty-one pupils, as shown in Table 1.

TABLE 1

First grade	-------	3 boys
Second grade	6 girls	2 boys
Third grade	6 girls	2 boys
Fourth grade	2 girls	------

The children in grades 1-4 at Pryor Public School.

Personal observations of the investigator revealed the following: Two of the children in this sample spoke only English--a first grade boy and his cousin, a second grade girl. The rest of the children spoke

both Crow and English, although none of them had a very extensive knowledge of English. All of the children had access in their homes to radio and television. There were five radio stations and two television stations which could be received from Billings, Montana. Many of them made occasional trips to Billings, where they sometimes saw motion pictures. Because there were no telephones in Pryor, most of the children had little experience using one. A large number of children came from broken or other wise disarranged homes. Most of the children were from large families living in small, crowded houses. Very few of them received much attention at home. Few of them liked or enjoyed school for many reasons, including the type of curriculum and parental attitudes. However, even in school these children were usually bright, eager, alert, independent, and feisty.

There were five types of data used in this study: The Lowenfeld Mosaic test, three selected tasks from Piaget, the Gesell Developmental Examination, the Stanford-Binet Intelligence Scale, and the Metropolitan Readiness and Achievement tests. Also included are some personal comments and empirical observations of the writer. Each of these sources of information hopefully shows something about the children. Three of these tests are developmental in nature--the Lowenfeld Mosaic, Piaget's tasks, and the Gesell Developmental Examination. The Stanford-Binet measures innate abilities. Lastly, the Readiness and the Achievement tests relate directly to the pupil's progress in formal school.

Three of these tests were given twice--the Gesell, the Metropolitan, and the Stanford-Binet--once in September, 1967, and once in May, 1968.

In both September and in May the Readiness and Achievement tests were given by the regular classroom teachers in their own rooms. In September the three first grade boys were not tested because of lack of a suitable test to specifically fit these children. One of the second grade boys was given a third grade achievement test because the teachers did not realize he had been retained. In September, the Gesell Developmental Exam and the Stanford-Binet were given by two trained persons, Dr. Elnora Wright and Mr. Warren Stone from Montana State University in Bozeman, Montana. They also graded those tests at both the beginning and the end of the year. Two small rooms in the school were used. In May, the four tests, Gesell, Stanford-Binet, Mosaic, and Piaget were given simultaneously in the multipurpose room of the school. For the most part, the tests were conducted by trained students from Montana State University. The children sat at the lunch tables for three of the tests. For the Mosaic, a small desk was set up apart from the tables. Two people were giving the Gesell; two others, the Stanford-Binet. The tests took varying amounts of time. Once in a while a child wandered around the room. In order to complete the testing in two days, the examiners gave tests all day. The children were shy, yet curious. The examiners occasionally had difficulty in understanding the children. A few times the examiners talked with the teachers after the test had been given for an explanation or interpretation of statements made by the children.

The Readiness test and the Achievement tests were given by the teachers in their own classrooms. Two days were allowed for the tests.

The first graders were given the Metropolitan Readiness Tests individually. The second graders were given the Metropolitan Achievement Tests, Primary Battery II. Third and fourth graders were given the Metropolitan Achievement Tests, Elementary Battery. Form A was given in September; Form B in March. Only Form A of the Readiness Test was given in March. The teachers encouraged the children to guess if they could not figure out the answer.

In most parts of these five types of tests, the examiners felt lack of understanding of and lack of ability to communicate in English on the part of the Indian children were definite barriers. Also, most of the examiners felt the children's lack of enunciation, improper pronunciations, unusual grammatical forms, and a low tone of voice caused difficulty. In some cases they felt the children's shyness and extremely short attention span made testing difficult. All examiners agreed that conducting four tests simultaneously in the same room was hazardous. However, despite disadvantages and limitations, the tests gave an idea of these children's abilities and development.

CHAPTER II

STANFORD-BINET INTELLIGENCE SCALE

Description of the test.

The Stanford-Binet Intelligence Scale first came into being in 1916 when Terman revised the original scale of Binet and Simon.[12] A second revision was completed in 1937; and the third revision in 1960. Thousands of subjects were used for standardization of each revision.

The Stanford-Binet Intelligence Scale attempts to measure intelligence as general mental adaptability.[13] Because the Scale attempts to measure general things, individuals often do better on one part than on another.

> Whatever the nature of intelligence may be, its manifestations in the individual are uneven. One individual will do better with one kind of material than he does with another.[14]

Included in the Scale are ninety-six tests. There are many different types of items including the following: Analogies, either similarities or differences, either pictorial or verbal; memory for sentences, which is repetition after the examiner; vocabulary; definitions; repetition of digits, either forward or in reverse; verbal absurdities such as "Bill Jones's feet are so big he has to pull his trousers on over his

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[12]Terman, Lewis M. and Maud A. Merrill, Stanford-Binet Intelligence Scale. Manual for the Third Revision Form L-M. Boston: Houghton Mifflin Company, 1960, p. 5.

[13]Ibid., p. 39.

[14]Ibid., p. 60.

head"; memory of design; duplicating design; and arithmetical problems. Terman and Merrill believed that tests such as abstract words, analogies, vocabulary, verbal absurdities, and others are more likely to show general intelligence than are manipulative tests.[15] Thus, verbal tests are somewhat more indicative of general intelligence.

In order to use the information gleaned from this whole test, the Stanford-Binet Intelligence Scale has been based on age as standards of performance. Two types of ages are important, chronological and mental. The chronological age is figured in months dating from the subject's birth. Mental age, however, is determined by the test. "Mental age (MA) on the scales is found by crediting the subject with his basal age plus all additional credits earned beyond his basal."[16] The basal age is the level at which all the items are passed just prior to the level at which the first item is missed. The ceiling or maximum is that level at which all items are missed. For the age scale of the test to be valid, there must be an increase in the number of subjects able to pass a given item at each successive age. Through much research and after many tests, a kind of progression was developed.

Giving and scoring the test requires about fifty hours of training. Besides knowledge of the test, there are three conditions necessary for

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[15] Ibid., p. 12.

[16] Ibid., p. 62.

valid test results:

(1) following standard procedures,
(2) eliciting the subject's best efforts,
(3) scoring all responses correctly.[17]

The length of time for this test varies from about one-half hour with a young child to one and one-half hours for older children and adults. On the L-M form of the Stanford-Binet (the form now used), certain items at each level are starred. By using only these starred items, the examiner can give the test in three-fourths of the usual time. The results obtained this way are somewhat less reliable than those obtained from the full test. However,

> Watson's survey of studies reporting the results of the use of the abbreviated scales indicates that the difference between means for full scale I.Q.'s as compared with abbreviated I.Q.'s is in no case statistically significant.[18]

The subjects at Pryor, Montana, were given the abbreviated form of this test.

Terman and Merrill have found that approximately 46% of the cases have I.Q.'s ranging from 90-110. This corresponds to the concept of average or normal.

Results of the Test.

In Pryor the abbreviated form of the test was given to the twenty-one children in October, 1967, and again in May, 1968. The following section reports the important results of the two tests.

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[17] Ibid., p. 46.

[18] Ibid., p. 62.

The basal age ranged from III to X with the largest numbers at V, VI, and VII. In October, the basal age range was from III to VII. By May it was higher, ranging from V to X. The ceiling also varied. In October it was from V to XI; by May it was from VII to XIII. Six children had a basal age below V in October. By May only one child was below V. Table 2 shows the number of children at each level.

TABLE 2

Level	Basal age		Ceiling	
	Oct.	May	Oct.	May
III	1			
III-6	1			
IV	3			
IV-6	1	1		
V	4	9	1	
VI	7	3	3	
VII	4	6	5	4
VIII		1	1	3
IX		0	4	10
X		1	2	1
XI			5	2
XIII				1

Basal Age and Ceiling in Oct. and May

Vocabulary seemed to be the most difficult item on the test. Of the first nineteen vocabulary words only straw, envelope, orange, puddle, eyelash, and roar were more often identified correctly than incorrectly. Only two children correctly identified juggler. Only one child correctly defined each of these words: Scorch, muzzle, haste, and regard. All incorrectly defined lecture, skill, brunette, peculiarity, and priceless. Most children missed lap, Mars, and gown. Table 3 shows the number who correctly defined the first nine vocabulary words.

TABLE 3

Word	Oct.	May
1. orange	20	16
2. envelope	19	18
3. straw	20	20
4. puddle	13	14
5. tap	11	8
6. gown	4	6
7. roar	11	12
8. eyelash	14	13
9. Mars	6	7

Vocabulary: Number Correct

At level V, the children all completed "the man." At level VI the differences confused many of them, especially the differences between wood and glass. Opposite analogies were often difficult also. However, the children answered the number concepts correctly in almost every case (seven of one hundred fifty incorrect). At level VII, the similarities between two things were often answered incorrectly. The similarity between iron and silver was missed most often. The section on comprehension was difficult too. Repeating five in order was also difficult. In similarities, comprehension, and repeating digits, over half of the answers given were incorrect. However, every child copied the diamond correctly. At level VIII the children began to answer more of the questions correctly than incorrectly. Still, over half the answers were incorrect for verbal absurdities; but only a third were incorrect for similarities and differences. Only finding the similarity and the difference between ocean and river proved difficult. At level IX only "repeat four digits in reverse order" had more incorrect answers than correct. Of the questions about making change only "25 - 4 = ____" had more incorrect responses than correct. The rhymes seemed

relatively easy. Only one had half the responses incorrect. That one was "name an animal that rhymes with fair." Both making change and rhymes had more correct than incorrect responses. Memory for design had the most correct responses. In some cases this was the only correct item at level XI where it again appears. Of the abstract words at level X, "surprise" was the only one correctly identified by more than half the children. At level XI the memory for design was correct. Also, similarities between three things were correctly observed in six of eight responses. The children then were most successful when dealing with number concepts, copying the diamond, similarities and differences, rhymes, and memory for design. They were least successful with vocabulary, differences, opposite analogies, comprehension, repeating digits, and verbal absurdities.

In October, I.Q. ranged from 68 to 108, with the median at 79. The average was 82. In May the range was from 71 to 116, with the median at 84 and the average at 86. The median was five points higher, and the average four points higher in May. Of the twenty-one children, seven decreased in I.Q. score; one child had the same score; and thirteen increased. The increases and decreases are shown by Table 4:

TABLE 4

points difference	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
number of children	1	1	4	1	1	2	1	1		2	1			2			1		2	1

Change in I.Q. scores

Of the seven who decreased, two were second graders, four were third graders, and one was a fourth grader. Only one boy showed a

decrease. A third grade girl had the score which remained the same. The gain of fourteen points was made by a second grade boy. All three first graders gained points; six second graders gained while two decreased; four third graders increased while four decreased; and one fourth grader increased while one decreased.

CHAPTER III

THE METROPOLITAN READINESS AND ACHIEVEMENT TESTS

Description of the tests.[19]

The Metropolitan Achievement Tests are a series of comprehensive achievement tests. They contribute to the teacher's understanding of and analysis of pupils' achievement and provide data for evaluation of pupil growth from year to year. The researchers suggest grades for use of each battery. However, if pupil achievement is much above or below the national average, a higher or lower grade battery should be used. In Pryor this was done by giving the first graders the Readiness Test in March.

Scoring can be done either by machine or by hand. A raw score is obtained and converted to a standard score by the use of a table. From the standard score the other measures are derived, also by the use of tables. The stanine is a "simple 9-point scale of normalized standard scores. . . ."[20] The units are equally spaced in the scale. Achievement is accurately portrayed. Use of the stanine makes comparison with others of the same grade level simple. It is also easy to use for a composite score or averages. Table 5 shows divisions of stanines and

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[19]The description is based on information from the teacher's manuals accompanying the tests.

[20]Metropolitan Achievement Tests Elementary Battery, N.Y.: Harcourt, Brace & World, Inc., 1959, p. 10.

the percentage of pupils at each level.

TABLE 5

9 4%	Superior	4%
8 7%	Above	
7 12%	average	19%
6 17%		
5 20%	Average	54%
4 17%		
3 12%	Below	
2 7%	average	19%
1 4%	Poor	4%

Stanines and Percentiles[21]

The percentile rank is another scale. It tells the per cent of pupils at a given grade who obtained a score equal to or less than the score in question. Percentile rank permits finer discrimination than do stanines. However, the units are not equal. Stanines and percentiles can be matched as shown in Table 6.

TABLE 6

Percentiles	Stanines	Ratings
96+	9	Superior
89-95	8	Above
77-88	7	average
60-76	6	
40-59	5	Average
23-39	4	
11-22	3	Below
4-10	2	average
Below 4	1	Poor

Matching Percentiles and Stanines[22]

The third scale is that of Grade Equivalent, "grade placement of

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[21] Ibid., p. 10.

[22] Ibid., p. 12.

pupils for whom the given score is the average of norm."[23] Thus, a grade equivalent of 3.2 means the average score of pupils in the second month of the third grade. This is the most common method of analysis. It is not satisfactory, however, when the pupils' achievement varies markedly from the average or normal. The units within Grade Equivalents are not equal. Also, they are not equal from subject to subject. However, they can indicate more directly than either the stanine or the percentile rank the pupil's growth from grade to grade in various subjects.

Some suggested uses by the classroom teacher are:[24]

(1) finding the achievement level to help with planning instruction,
(2) comparing achievement (past and present) to see progress,
(3) determining the average achievement level of the class in each subject.
(4) finding the range of abilities of pupils in each subject,
(5) using as a basis for grouping,
(6) starting to diagnose an individual pupil's learning difficulties.

The Metropolitan Achievement Test Primary Battery II for grade two consists of six tests. Test 1, Word Knowledge, has 37 items to test recognition and understanding. The first 17 of these are picture vocabulary. The last 20 are a stimulus word and 4 responses for each such as: Sugar is ____sweet ____sour ____salty ____bitter. Test 2, Word Discrimination, has 35 items which test discrimination between four similar

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[23] Ibid., p. 14.

[24] Ibid., p. 16.

words. The examiner gives the word to be chosen. For example, "Come. Will the airplane come down? Come." The child then chooses among 4 words: ___some___come___came___could. Test 3, Reading, has two parts. The first 13 items are for the child to choose among three sentences the one which best describes the picture. The second 38 items are reading selections followed by questions. Test 4, Spelling, is a dictation test of 30 items. Test 5, Arithmetic, also has two parts. Concepts and Problem Solving has 42 items such as 10, 20, ___, 40, 50, and verbal problems. Computation has 30 items of addition and subtraction.

The Metropolitan Achievement Tests Elementary Battery for grades 3 and 4 consists of seven tests. Test 1, Word Knowledge, is a 50-item vocabulary test of completing sentences such as: A doll is a . . . __fairy__toy__pupil__face. Test 2, Word Discrimination, is a 36-item test of completing sentences such as: The train was a __late. __middle __minute __minuet __mitten. Test 3, Reading, is several reading selections followed by questions to measure various types of reading comprehension. The questions include:

(1) the main thought,
(2) the literal meaning or information contained,
(3) correct inferences,
(4) the meaning of a word from context.

Test 4, Spelling, is a 40-item dictation test. Test 5, Language, has two parts. Part A, Usage, has 24 grammatical usages. The child must decide if the usage is correct or incorrect. If he decides it is incorrect, he must supply the correct usage in its place. Part B, Punctuation and Capitalization, has 36 items. The child must decide what punctuation

or capitalization is needed, if any, and supply it. Test 6, Arithmetic Computation, has 47 items to measure addition, subtraction, multiplication, and division. Test 7, Arithmetic Problem Solving and Concepts, has two parts. Part A is verbal problems. Part B tests other concepts, such as Roman numerals and approximate answers.

The Metropolitan Readiness Test is the beginning of this series. It is designed for the end of kindergarten or the beginning of first grade. Readiness includes a number of skills, such as linguistic attainments and aptitudes, visual and auditory perceptions, muscular coordination and motor skills, number knowledge, the ability to follow directions, and the ability to pay attention in group work. The Readiness Test has six subtests to measure some of these factors. In the 16-item Word Meaning test the child chooses the one of three pictures which best illustrates the word given orally by the examiner. The Listening test has 16 items. Again the child chooses the picture to illustrate an incident described in phrases or sentences. The third test, Matching, is a test for visual perception of similarities. In the Alphabet test, the child picks out the proper lower case letter from four given. Again there are 16 items. The 26-item Number test measures number knowledge. The sixth test is one of Copying. It is used to test visual perception and motor control on 14 items. There is a seventh test which is optional. This Draw-a-man test is an index of intellectual maturity.

Because there are so few items on each test, the total score is the more desirable to determine readiness. Percentile ranks are given to correspond with the total score. Stanines and letter grades are also

given for the total score. All three first graders from Pryor received the letter grade of "B".

> B High Normal. Good prospects for success in first grade work provided other indications such as health, emotional factors, etc., are consistent.[25]

If the child is emotionally immature, his first year of school should include numerous activities. Language activities are expecially necessary.

This test, like the achievement tests for higher grades, can be used in different ways by the teacher. She can:[26]

(1) get a quick indication of the pupil's readiness for first grade work,
(2) identify specific areas in which a child is immature,
(3) have a basis for initial grouping,
(4) determine the range of readiness of the class,
(5) adapt instruction to the group or class,
(6) have an indication of when to begin formal instruction of reading and numbers,
(7) obtain a measure of the pupil's progress when used with the achievement test at the end of the year.

Results of the tests.

On the Readiness test the three first graders scored almost the same. Of the possible total of 102, two scored 71 and one scored 64. There were two percentile ranks of 81 with the stanine of 7; and one percentile rank of 69, stanine of 6. Only one child had all answers correct on the alphabet test. One boy missed a fourth; the other, about a third. On

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[25]Metropolitan Readiness Tests N.Y.: Harcourt, Brace, & World, Inc., 1959.

[26]Ibid.

the numbers test all three missed nine or about two-fifths of the total. One boy missed a fourth of the listening test; the other two, about a third. The matching test had the greatest variation, with the children incorrectly pairing two, six, and seven of fourteen. The copying test varied from just under to just over half correct. The letter grades on the Draw-a-man test were B, C, and D, with the child with the lowest score making the B grade.

Of the eight second graders, two boys need special consideration on this test. One boy was not yet in school, so he did not take the first Primary Battery II in September; but he did take the one in March. The second boy was in the hospital in March and missed that testing. In September he was incorrectly placed in the third grade; consequently, he took the test given in that grade. He refused to do the first two tests. He scored very low except for Problem Solving and Concepts.

Of the second graders considered, all went up on Word Knowledge. The rise in standard scores ranged from 9 to 28; mean, 18. Word Discrimination did not show the same rise. The standard score changes ranged from -2 to +4 with the mean at +1. The reading scores fluctuated with half gaining and half losing points. Most stayed about the same; but one made tremendous strides, gaining 19 points on standard score, 2 on the stanine, and 1.8 in grade equivalent. In Spelling, as in Word Knowledge, everyone gained. The standard score gains averaged 18; and the grade equivalents ranged from 0.4 to 1.8. The Arithmetic test is divided into three parts: Two subtests and the total. Only

the total deals with grade equivalent. On the subtest Concepts and Problem Solving, everyone made gains in standard scores with a mean of 16. However, half dropped in stanine. On the subtest Computation, the change in standard score ranged from 2 to 10. There were no drops on the total of this test, although half the class made no change in stanine rank. The mean rise of the standard score was 12; and the mean change in grade equivalent was 0.8. In looking back, the second graders made their largest gains in Spelling, Word Knowledge, and Arithmetic, especially Concepts and Problem Solving. They made their smallest gains in Reading and Word Discrimination.

The stanines and grade equivalents for the second graders in March revealed that only in Arithmetic and Word Knowledge was the class as a whole average according to the test and its norms. The Arithmetic Total was the closest to average. The stanines ranged from 1 to 6 and grade equivalents from 1.0 to 3.0. For Word Knowledge, the stanines ranged from 3 to 8 and grade equivalents from 1.7 to 3.5. Next was Spelling. In Reading, stanines ranged from 1 to 7. Last was Word Discrimination. The stanines, when averaged for the class, showed the tests in order as shown by Table 7.

TABLE 7

	Stanine Average	Grade Equivalent
Arithmetic	4.5	2.1
Word Knowledge	4.0	2.2
Spelling	3.0	1.7
Reading	2.7	1.9
Word Discrimination	2.5	1.8

Ranking of second grade scores.

Of the seven second graders two had stanines of 3 or above in all tests;

one had only one stanine of 2; and two had two stanines of 2. The other two children had only one stanine of 3 or above.

On the Word Knowledge test all third graders had a rise in standard score. The mean rise was 10; for the stanine it was slightly above 0; and for grade equivalent, 0.8. In Word Discrimination only one child dropped in score. In Reading all showed gains in standard scores. The changes in standard score on the Spelling test ranged from -5 to +13. Language was divided into three parts, two subtests and the total with only the total dealing with grade equivalent. The subtest Usage had the widest range of change. The change in subtest Punctuation and Capitalization was not so great. Because of the fluctuation of the subtests, the total also varied. There was wide fluctuation in Arithmetic Problem Solving and Concepts. Only in Arithmetic Computation did all third graders make large gains. Standard scores varied 5 to 18 points, mean 13; stanines 1 to 4; and grade equivalent mean of 1.2. The third grade class had three tests on which everyone had a stanine of 3 or above. They were Word Knowledge, Word Discrimination, and Computation. Only one child was below stanine 3 on the total of Language; only two on Problem Solving and Concepts; and two on Spelling. The class average of stanines for the third grade was closer to national averages than for any other grade reported in this study. Table 8 shows order of the third grade scores. Half of the third graders had stanines of 3 or above on every test. Two of those had stanines of 4 or above. Three children had only one stanine below 3; and one had three stanines below 3.

TABLE 8

	Stanine Average	Grade Equivalent
Computation	6	3.8
Spelling	4.5	3.3
Language (Total)	4	3.1
Usage	5	
Punctuation and Capitalization	3.5	
Word Discrimination	4	2.9
Problem Solving	3.5	2.9
Reading	3.5	2.8

Ranking of third grade scores.

The fourth graders scored farthest from national averages of the grades discussed, probably because there were only two in that grade. One child increased and one decreased on all tests except the language tests and Computation. The fourth graders did not reach a high achievement level. One fourth grader ranged in grade equivalent from 1.8 to 3.8 in March; the other ranged from 3.0 to 5.0. In stanines one ranged from 1 to 3; the other, from 3 to 6. The stanine and grade equivalent averages for each child are shown in Table 9.

TABLE 9

	Stanine Pupils		Grade Equivalent Pupils	
	A	B	A	B
Computation	3	4	3.8	4.2
Spelling	1	6	1.8	5.0
Language (Total)	2	5	2.6	3.9
Reading	2	3	2.6	3.0
Problem Solving	2	2	2.9	3.0
Word Knowledge	1	3	2.5	3.2
Word Discrimination	1	3	2.3	3.0

Test of each fourth grader.

One fourth grader then was in stanine 3 or above on all except one test; the other was in stanines 1 or 2 except for one test.

In a comparison of second, third and fourth graders' scores it was found that arithmetic tests ranked highest with stanines of 4, 5, 6, and

3.5; and grade equivalents of 2.1, 3.8, and 4.0 for the three grades. Spelling ranked third for the second graders, but it ranked second for the third and fourth graders with stanines at 3, 4, and 3.5; and grade equivalents at 1.7, 3.3, and 3.4. Lowest socres for the three grades were those requiring reading or reading skills. They included Word Discrimination, Problem Solving and Concepts, and Reading.

CHAPTER IV

GESELL DEVELOPMENTAL EXAMINATION

Description of the test.

The Gesell Developmental Examination was developed by Frances L. Ilg and Louise Bates Ames at the Gesell Institute of Child Development. The work on the test began in 1957. Although the test itself has been developed, standardization is still continuing.

Many criteria have been established for entrance to school: Chronological age, eruption of the six-year-old molars, I.Q., Reading Aptitude tests, and readiness tests.

> What we really need to know in determining readiness for school entrance is a child's developmental level. We need to know at what age he is behaving as a total organism. This is not a measure of his level of physical maturity, though physical maturity or immaturity can provide supporting evidence.[27]

Thus has the Gesell Developmental Examination been developed to give educators the clue to the child's developmental level. Ilg and Ames fully believe:

> a 5-year-old level of behavior to be necessary before a child can effectively carry out the work expected of a kindergartner in most schools; a 6-year-old level of behavior necessary before a child can do first grade work.[28]

This does not mean, however, that being five or six necessarily means the child is operating at that level of behavior.

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[27]Ilg, Frances L. and Louise Bates Ames, School Readiness-Behavior Tests Used at the Gesell Institute, N.Y.: Harper & Row, Publishers, 1965, p. 17.

[28]Ibid., p. 18.

> We prefer to reckon 5-year-oldness in terms of behavior rather than in terms of age in years. Thus regardless of age in years, we consider that a child's general performance needs to be at the 5-year-old level before he enters kindergarten. . . .[29]

The test, as it was given to the twenty-one subjects at Pryor, Montana, consisted of several parts: The initial interview, the paper and pencil tests, the copy forms (two- and three-dimensional), and the Incomplete Man. The test took approximately one-half hour per child. During the interview, the examiner asked the child several questions. He then recorded the child's answers as accurately as possible. There were five routine questions:

(1) How old are you?
(2) When is your birthday?
(3) Did you have a birthday party? Who came? What was your favorite present? What did you do?
(4) How many brothers and sisters do you have?
(5) What does your Daddy do?

Ilg and Ames have found that these questions are within the scope of school age children. From five-year-old on, the child can verbally tell his age. Seven-year-olds know both the month and day of their birth. The five-and-a-half to six-year-old is well aware of having a party, of what he did, and of what his favorite present was. Even five-year-olds have a good concept of brothers and sisters. By five-and-a-half they are reasonably aware of what their father does.

The paper and pencil tests are given next. A piece of green $8\frac{1}{2}$ x 11 paper and a pencil are on the table. The child is asked to write his

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[29] Ibid., p. 18.

name, his address, the date, and the numbers from 1 to 20 or as high as he can go. (Writing the numbers is often saved until after the copy forms.) Most five-year-olds can print their first name or nickname although they use all capital letters. By seven the child writes his first and last names and uses small letters as such. The address is more difficult. It is not until eight years old that 54% of the girls and 46% of the boys can give their street and number, city and state. It is not until nine years old that the concept of name and address as one uses on a letter becomes common. Eight-year-olds can give the date, including the day, month, and year. At ten, a significant number recorded the month as a number. By six-years-old, 42% of the girls and 56% of the boys write up to 20. By seven, the percentage is almost 100%. Most children from five-and-a-half on write the numbers horizonatally. Size is also important. Large numbers (one-half inch or more) are common in five-year-olds. By seven, medium sized numbers (one-fourth inch) predominate. By nine, small numbers are common. The base line of the numbers has become more even by seven. But it is not until nine that good spacing becomes normative, although good spacing begins about six. Reversals and forming numbers incorrectly are most common in the five- to six-year-olds.

There are six two-dimensional copy forms: A circle, a cross, a square, a triangle, a divided rectangle, and a diamond which is presented in two ways. (See Fig. 1.) These are shown to the child on cards which are placed in a pile on the table. The diamond is first horizontal and

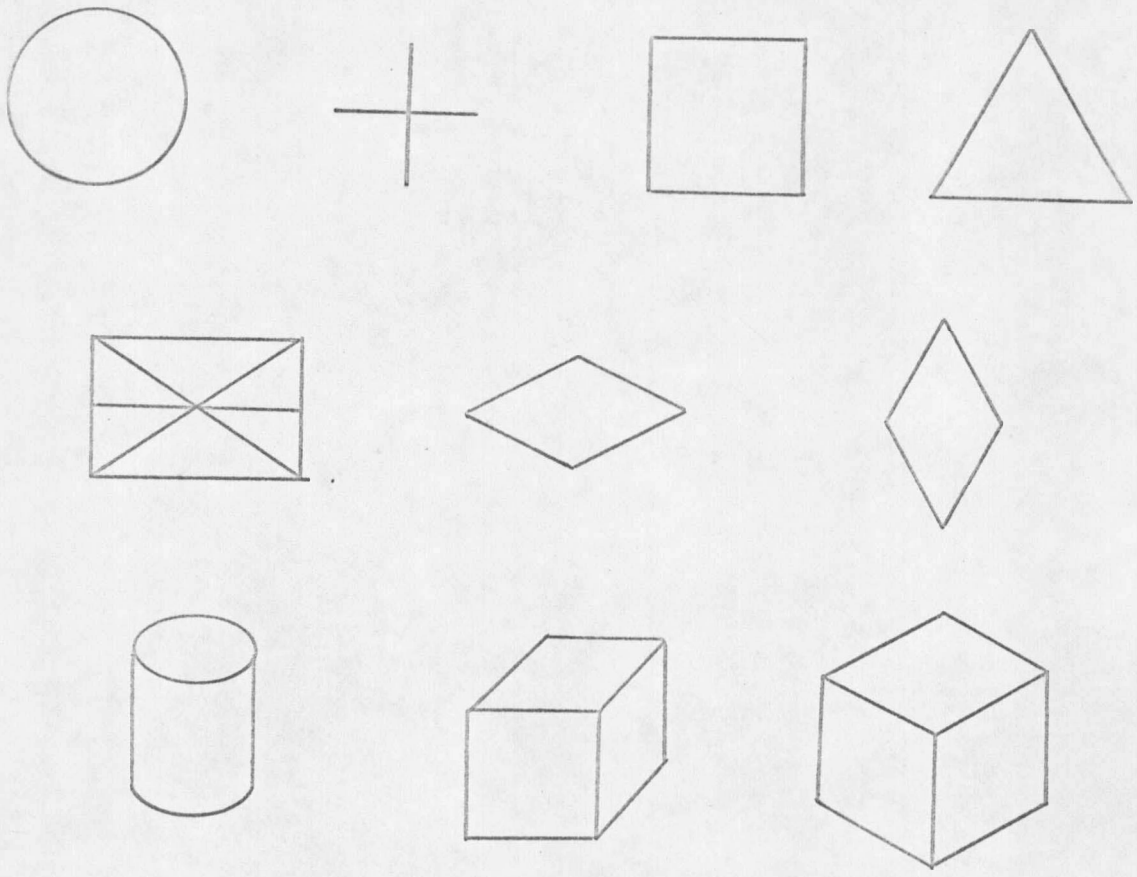
then vertical. The child responds on the same green paper he used for the paper and pencil tests. Sometimes the child does a better job if the copy forms are presented before he is asked to make the numbers. After these seven forms have been drawn, the child is shown two three-dimensional objects, a cylinder and a cube. He is asked to draw the cylinder; then the cube face-on; and lastly, the cube point-on. Five-year-old girls and five-and-a-half-year-old boys make their circles counter-clockwise from the top down. By seven, girls can make a beautiful, perfect circle, although this is delayed in many boys until nine. The cross is more difficult; at nine-years-old it becomes normative. At seven the vertical cross is common. There are many methods of copying a square. Even by ten, a well proportioned square has not reached normative levels. A too vertical square is common at four but negligible by eight. The horizontal square is the opposite, reaching its peak about eight. Closure points cause problems at five and six. The five-year-old has trouble making the triangle; however, by seven a well proportioned triangle is normative. The divided rectangle is the most difficult of all. By five-and-a-half some sort of successful production of the outside is possible. There are three main ways of making the inside. First is the central star pattern. The lines radiate either into or out of a central area. This does not occur much beyond six. However, when it occurs after six the lines are so accurate an observer would not know they were formed this way unless he saw them being made. (See Fig. 2). The second type are the cleavage patterns. These are made chiefly with a vertical central line with horizontal or oblique

lines that do not cross correctly. By five-and-a-half the child may put a dot in the center and draw to or from that dot. The third way is the cross-over pattern. By six these reach normative proportions. They include these patterns: +x, x+, and lx-. The +x pattern takes the lead from six on. However, correctly divided rectangles are not normative even by ten years old. The last two-dimensional copy form is the diamond. First it is presented horizontally, then vertically. It is a seven-year-old item from Binet. Girls have more trouble with these than do boys.

When the diamonds are finished, the cylinder and cube are presented. The five-year-old draws a circle, calling it the bottom or the top of the whole thing. The circle made at six is said to be the top. By seven other parts are included (). By eight the curved base is in (). The face-on-cube is often depicted as a square. From eight on the child is beyond single surface responses. The point-on-cube may not even be attempted before seven. However, at seven it may be drawn as a diamond.

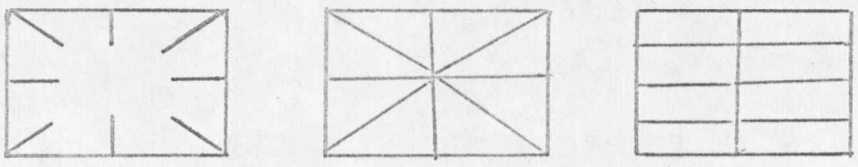
After all the paper and pencil tests and the copy forms are finished, the examiner should look at the overall paper. Messy papers are evident as opposed to neat and orderly ones. Some evidence includes: Overlapping lines, lines not meeting, spacing between figures, piling of figures on one another, and type of stroke. Messy papers are given a "B" quality; neat ones, an "A." For most children between five and ten, one page is sufficient for the paper and pencil and copy forms tests. From about five-and-a-half on, horizontal arrangement of forms

FIGURE 1



Gesell Copy Forms.

FIGURE 2



Ways of Making a Divided Rectangle.

is common. Relative size of forms is variable. By seven and eight many are drawing the forms more evenly in size. There are very few marked and irregular shifts in size from seven on. Handness makes some difference in the direction of drawing.

> Nearly all these patterns of drawing which are contrary to the normative methods, occur mostly in left-handed children and the percentage of left-handers so drawing tends to increase with age. In spite of this, many left-handed subjects do draw in the generally normative direction and manner for nearly all of the different forms.[30]

The figure of the Incomplete Man is presented to the child on an $8\frac{1}{2}$ x 11 sheet of blue paper. (See Fig. 3). This figure is a part of the test which children truly enjoy and do remember. "The line, angle, and length of each part. . .allow for many stages of perceptions and therefore of execution."[31] All missing parts, except the eyes, have a model. There are nine parts to be copied. There are many extra parts which may be added and counted as such. The examiner gives the child the paper and asks, "What does this look like to you?" The examiner records the answer, the order of parts, and all verbalizations.

When the child has finished the man, he answers some questions:

(1) What is his facial expression? or How does he look?
(2) How does he feel inside?
(3) Is he happy or sad?
(4) How could you tell?

In naming the figure, the most common response is "man"; the next is

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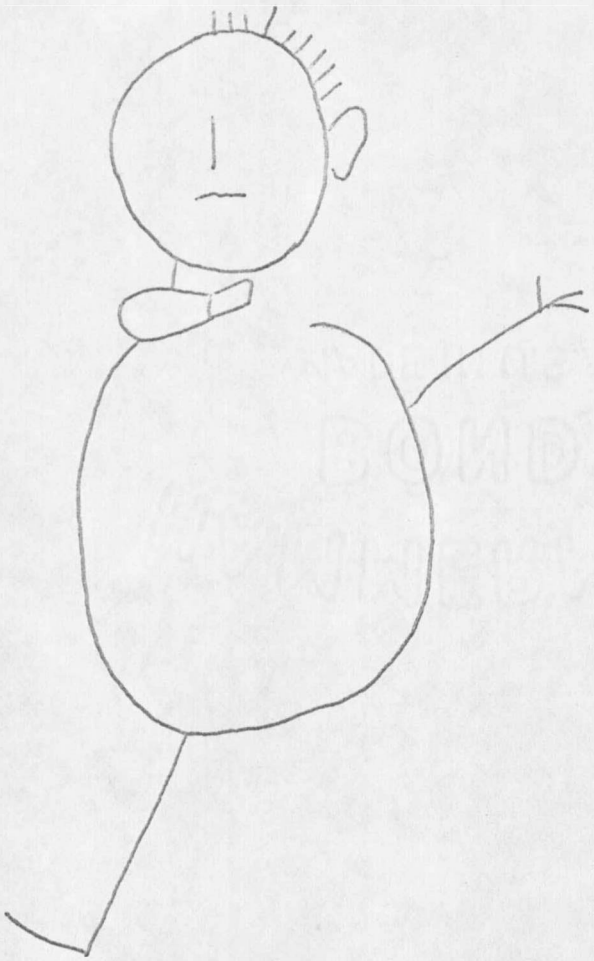
[30] Ibid., p. 127.

[31] Ibid., p. 130.

"boy." By seven or eight years old, children do not understand "facial expression"; therefore, the examiner uses "How does he look?" The five-year-old generally gives a positive answer. The six- to seven-year-old is more likely to give a negative response. Sometimes the figure is merely renamed a man. By eight or nine the response may be outward such as surprised or scared. The answer to "How does he feel inside?" again usually brings a positive response from the five-year-old. "Is he happy or sad?" is often answered as "sad" despite previous positive responses. The five-and-a-half-year-old may answer "mad." "How can you tell?" is answered by the younger child as "cuz" or "I can tell." As the child grows older (seven on), he is more likely to refer to parts of the face as supplying his clues.

Children of different ages attack the figure differently. A four-year-old first does the leg, then the arm. A few see the need for an ear. The neck line and eyes may be added. At four-and-a-half the man may take on a wild look. The child may add extras such as a belly-button and genitals at this age. The five to ten-year-olds need little help. Boys may start with the arm and leg; girls, with the head region. At seven the tie area may be worked on first. Hair may cause problems. It is often too long and extends too far down at five and five-and-a-half. By seven most children have better control of their strokes. At nine the hair is placed accurately. The eyes allow for the most individual responses since they have no model. The younger child can barely make them. By six the eyes are pretty well placed. At seven they may be only small, closed circles or even dots. By nine, the oval shape is common for eyes.

FIGURE 3



INCOMPLETE MAN

Adding eyebrows is marked at eight. From five to nine, the child progresses slowly but steadily with the ear. Some five's omit it. But by nine most ears have achieved correct size and placement. For the average child, even by ten correct shape is not possible. The neck and tie part demands the most of children. Many do not seem to know what to copy. The tie may not be noted by the five-year-old. However, this child will complete the body line and recognize the need for a neck line. Often the neck line and body line are two separate lines. The second step is to add the tie. By seven the whole area is coming under pretty good control. The final step of dropping the unnecessary body line comes later. Sometimes the tie is seen as an arm coming from behind. The missing arm is almost always added. The four-year-old tends to draw the arm downward and place it very low. By five the arm often points straight out from the body. About five-and-a-half it starts pointing upward. At six and seven it may be too long or too short or just right. Adding fingers can also pose problems. Sometimes too many fingers are added; they may be in the shape of a vertical line crossing the horizontal. They are, however, reproduced correctly from eight on. The leg is the part most often completed first.

> It is the part closest to the child and most easily seen by him. Its placement presents the same general range of possibilities as that for the arm. It can be placed just right or too far in or too far out on the body line. Likewise, its direction can be just right or too straight down or too obliquely outward. The length also has its threesome possibilities of just right, too short or too long.[32]

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[32] Ibid., p. 150.

Again, it takes growth and time before the making of the leg and foot is just right. By eight years old the child is coming closer to making it correctly. Several types of extra parts or marks are often made. Usually it is the younger child who supplies these. The parts include: Belly-button, clothes, cheeks, teeth, extra arm or leg or fingers, and filling or shading in. There may also be marks on the nose, mouth, or ear. Upon finishing the Incomplete Man, the child has completed the test as it was given in Pryor, Montana.

Results of the test.

Thumbnail sketch. The thumbnail sketch was the examiner's description of a child. It was written after the test was completed. It was short and to the point. At the beginning of the year statements such as these were used to describe the children in Pryor: Shy, seems sharp, capable, eager, wanted approval, slow, and wiggled. At the end of the year these observations were made: Hard time concentrating, good worker, eager, wiggled, wanted approval, played with pencil, matter of fact, quiet, and shy.

Initial Interview. The initial interview gave the examiners some interesting information. At the beginning of the year thirteen children did not know their birth date while eight knew the day and month. By the end of the year only seven did not know; two knew only the month; eleven knew the day and month; and one knew the day, month, and year. Most children told about a party, although the party was not necessarily their most recent one. One child said "never had a party, but if I did. . . ." The favorite present was not necessarily a birthday gift;

and a few children mentioned clothes rather than a toy as their favorite present. At both the beginning and end of the year one child did not tell of a favorite present. Most children gave names of brothers and sisters (twelve at the beginning of the year; twenty-one at the end). Most who gave names also gave ages. However, because in the Crow culture cousins are called brother or sister, several children included names of cousins; a few left out some of their own brothers or sisters; and some left out brothers or sisters but included cousins.

The question "What does your Daddy do?" brought a variety of responses. One child made up a story about a dream father. Another said "I don't have no father, but Mother cleans house and gets us ready for school." Some children had no father and said so. A few children who did not live with their father responded with "not home, works at Crow (Agency)," and "lives in Billings." One boy said of his father "doesn't work," which was true. Another said "doesn't work, goes to see about rodeo." Several children said their father worked in Crow Agency or in Billings but that they did not know what he did because they had never been there. At the beginning of the year three children said only "works"; three others named the town in which their fathers worked; two named the building in which he worked; and only two gave specific hints of jobs, one saying "he draws" (her father is an artist) and the other saying "Special Police." At the end of the year two said "works"; four named the town; one named the building; and two said of their fathers "works in hospital laundry." Most other children mentioned something of ranch work such as works on tractor, stacks hay, builds barns, and

rides horse. Some mentioned hunting. At the end of the year two children said their father "plays baseball." There seemed to be little concept of jobs or occupations among the children, perhaps because so few had fathers who held steady jobs. Only one child had a father who held the same job all year.

Paper and pencil tests. At the beginning of the year, one child used all capital letters for his name while two others mixed capital and lower case letters. One child reversed one letter; another reversed his entire name. Sixteen children wrote their first and last names; one started his last name but did not finish. One child was left handed. All did an acceptable job of writing their name with the right hand. Twelve did a poor job writing their name with their left hand. Size of letters varied. Twelve children made letters between one-half inch and one inch; six were between one-fourth and one-half inch; and two made them smaller. Eight children used cursive writing. By the end of the year, only one child mixed capital and small letters; and only one reversed letters. Fifteen children wrote first and last names. Eleven did a poor job using their left hand. Nine children made letters between one-half and one inch; and eleven made them about one-fourth inch. Ten used cursive writing. Two children used cursive for part and manuscript for the rest.*

At the beginning of the year no one attempted address. By the end,

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*Cursive is "writing"; manuscript, "printing."

five children tried. Most wrote zip code and/or post office box number, but one child wrote the whole thing. At the beginning of the year only one child tried the date; at the end seven children tried, one writing all of it.

At the beginning of the year three children did not write the numbers to 20; two wrote less than five. By the end, two wrote less than 20. In the first test eleven made their numbers one-half inch or bigger; and ten made them about one-fourth inch. At the end of the year one made the numbers one inch; ten others were larger than one-half inch; seven made them about one-fourth inch; and three made them smaller. As a group, spacing between numbers was much better at the end than the beginning of the year. Both times four children put the numbers on the back of the paper. Three children wrote the numbers in columns at the beginning of the year; only one did at the end. Most children wrote the numbers with no break in the line. However, when a break occurred, it was usually at 10 (four children did at the beginning; five, at the end). One child made a 1; another made a 1 and 4. Making numbers that way shows superiority.

Copy forms. There are seven copy forms. (See Fig. 1.) At the beginning of the year fifteen children made the circle counterclockwise starting just right of the top. Four went clockwise, two starting at the bottom and two on the left side. One used two strokes. At the end, eighteen started about the top and drew counterclockwise.[33]

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[33]Figure 4 shows the most common ways the children at Pryor made their copy forms.

Most children drew the cross with two strokes, first going down, then across left to right (eleven at the beginning and sixteen at the end). On the first test nine others went across, then down. At the end, four went down, then right to left.

The most common way to make the square was to begin at the upper left hand corner and draw continously down and around. At the beginning of the year five children used 2 strokes to make the square; three used 4 strokes; two used 1 stroke in a different pattern; and one used 3 strokes. At the end of the year three used 1 stroke in a different way; four used 2 strokes; two used 3 strokes; and five used 4. Thus, over half made the square in their own individual way.

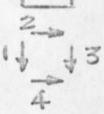
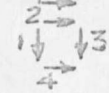
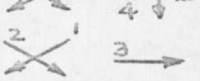
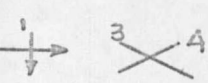
At the beginning of the year the greatest number of children made the triangle in one stroke starting at the upper left, drawing down and around (seven). Three others used a 1-stroke pattern in a different direction. Nine used some sort of 3-stroke pattern. At the end of the year, nine made a 3-stroke pattern while eight made a 2-stroke pattern. Four made 1-stroke patterns.

The horizontal diamond was also made in many ways. Ten children used 1 stroke to make it; three used 2 strokes and six used 4 strokes at the beginning of the year. At the end of the year, eight used 1 stroke; four used 2 strokes; three used 3 strokes; and six used 4 strokes. One child turned his paper to make that figure at the beginning of the year.

The vertical diamond was also made in many ways with only a few children making it each way. At the beginning of the year eight children used 1 stroke, three used 2 strokes, three used 3 strokes, and seven

FIGURE 4

HOW CHILDREN MADE COPY FORMS

FORM	BEGINNING OF YEAR		END OF YEAR	
	NO.	METHOD	NO.	METHOD
Circle:	15		18	
	2			
	2			
Cross:	11		16	
	9		4	
Square:	10		7	
	2		2	
	2			
Triangle:	7		4	
	3		4	
	2		2	
			3	
Divided Rectangle: Box:	9		11	
	2		2	
Inside:	2		3	
	3		3	
	3		3	
	2		3	
			2	

FORM	BEGINNING OF YEAR		END OF YEAR	
	NO.	METHOD	NO.	METHOD
Horizonatl Diamond:	5		3	
	3		4	
	3		2	
	2		2	
	2		2	
			2	
			2	
Vertical Diamond:	6		5	
	3		4	
	3		3	
	2		3	
	2			
	2			
Cylinder:	6		5	
	7		8	
Cube Face-on:	8		6	
	3		4	
	2		3	
Cube Point-on:	5		5	
	5		6	
	2		2	
	3		2	

used 4 strokes. At the end of the year, fourteen used 2 strokes, and six used 4 strokes.

The divided rectangle consists of two parts, the box and the star. Most children made the rectangle as they did the square. At the beginning of the year seven children used some sort of radiating pattern to form the star; by the end, only three used that pattern. At the beginning of the year seven children used a lx- pattern; at the end, five used it. At the end of the year seven used the x+ pattern in some variation; only three used it at the beginning. At the end, six used a variation of the +x pattern; but only two did at the beginning.

The three-dimensional objects were difficult for the children. Most saw the block face-on as a square of divided square (⊞). The cube point-on was seen as a square or divided square by ten at the beginning and six at the end. At both the beginning and the end something capped by a diamond or triangle was often drawn. The front of the cylinder was seen as a square by four children each time. The top was pictured as a circle by three children at the beginning and two at the end. The cylinder with the top and bottom showing was drawn by six at the beginning and five at the end of the year. The more mature cylinder with only the top and sides showing was drawn by seven children at the beginning and eight at the end, with only two children drawing rounded bottom both times.

At both the beginning and end of the year four children used both sides of the paper. The others used the entire front page at the beginning while only seven did at the end. At the end of the year five

children used about two-thirds a page. Seven at the beginning and four at the end used one-half page. Two children used only about a third a page at the end. Eleven children made big figures at the beginning of the year, while only four did at the end; six made medium-sized figures at the beginning, and eight did at the end; four made small figures at the beginning, while seven did at the end; and two children varied size at the end. Most children had rather wobbly, dark strokes in their copy forms. Most children placed their figures in rows (eleven at the beginning, thirteen at the end). Each time, three placed forms in columns. The others just placed forms at random. At the beginning of the year one child piled his forms; and one decorated his, turning them into houses and cups. At the end, one child shaded in a figure.

Incomplete Man. The Incomplete Man test consisted of answering a few questions, completing the picture, and answering a few more questions. In both tests "boy" was the response given by the greatest number of children (nine both times) to the question "What is it?" Six answered "man" the first time; eight the second. Other responses included "missing arm, leg, and eyes," and "boy that needs repair." The leg was drawn first by most children (twelve at the beginning, eleven at the end). If the leg were not first, usually the neck area was (five both times). At the end of the year four children drew the tie first. Most children tackled the arm second (nine at the beginning, seven at the end). Two children did the neck or eyes second at the beginning of the year. At the end, four children did each the ear and the tie second. Five children did the arm or the hair third at the beginning, and four

did the eyes. At the end, five did the neck or eyes third and four did the hair. In response to "How does he look?" five repeated boy, two others said good boy; four said funny; and three said man at the beginning. Other responses included surprised, bad, and naming of parts. At the end of the year seven children said funny; three said sad; and two said fine. Other answers were pretty, man, boy, good, mad, happy, and shouting.

"How does he feel inside?" brought responses of good, sad, warm, full, funny, and soft at the beginning of the year. The responses were happy, sad, fine, fat, well, nothing, sleepy, good, and sick at the end of the year. At the beginning of the year nine said he was sad; seven said happy. At the end, ten said happy; eleven, sad, when asked if he were "Happy or sad?" Many children said they could tell by his mouth (six both times). Most of the rest of the answers at the beginning related to some part of the face. At the end, in addition to parts of the face, answers included dancing, finished, fixed, and raising hands when asked "How can you tell?" The term "facial expression" brought two answers at the beginning of the year and eleven at the end.

At the beginning of the year many extra parts were added; the one added most frequently was eyebrows (ten children). At the end of the year very few extra parts were added, although ten children did add eyebrows.

Most children made the eyes with pupils. Most also placed their eyes too high and unevenly. Most children did not put the indentation in the ear, made the wrong shape, placed it about right, and made it

about the right size. In drawing the hair most children made too few hairs and extended them too low on the head. The arm was usually placed too low and made too long. At the beginning of the year one child made the fingers correctly; at the end, three did. Usually the leg was placed too far from the model. At the beginning of the year it was usually too short, but at the end it was usually too long. The foot was usually the wrong length and at too much of an angle. The most common mistake with the tie was shape; with the neck, it was drawing the neck line through the tie.

Grading the test. These tests were scored by Dr. Wright and Mr. Stone of Montana State University. Later, Mr. Clyde Gillespie very quickly scored a few. In most cases Dr. Wright and Mr. Stone agreed in the scoring. However, Mr. Gillespie scored the tests much higher. For this study, the scores given by Dr. Wright and Mr. Stone were used.

The ages, as arrived at by the test, ranged from 4 to $7\frac{1}{2}$. In most cases the scores were almost two years behind the child's chronological age. In no instance were the child's score and chronological age the same. The average gain in developmental age, as measured by this test, was just over one year.

In almost all cases, the children responded normally. That is, the responses of the children at Pryor, Montana, were very similar to those reported by Ilg and Ames.

CHAPTER V

THE LOWENFELD MOSAIC TEST

Description of the test.

The Lowenfeld Mosaic Test (LMT) is a dynamic instrument. It shows the way an individual performs, the way in which he meets life situations. The test shows the personality in spontaneous action.[34] To be more specific, the LMT should disclose various facets of personality, give information about the subject's perception and manipulation of objects, and show the way he performs in new situations.[35] For children, the LMT can give information about two things:[36]

> (1) where the individual is functioning, his maturity level,
> (2) something of what his individuality is like. . . in action.

The LMT consisted of pieces of plastic one-sixteenth inch thick in five shapes and six colors. The square was the basic shape. The diamond had sides the same length as the square. By cutting the square in half, a right angle isoceles triangle was formed. The hypotenuse of that triangle formed the length of the sides of an equilaterial triangle. The scalene triangle was formed by cutting the equilateral in half.[37]

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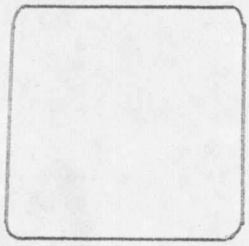
[34]Ames, Louise Bates and Frances L. Ilg, Mosaic Patterns of American Children, New York: Harper and Brothers, 1962, p. 3.

[35]Ibid., p. 4.

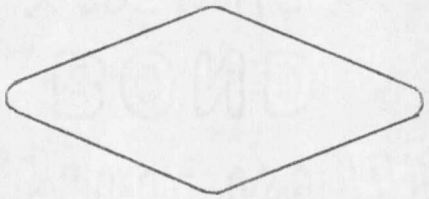
[36]Ibid., p. 7

[37]Lowenfeld, Margaret, The Lowenfeld Mosaic Test, Southampton, Great Britain: The Millbrook Press Ltd., 1954, pgs. 32-33.

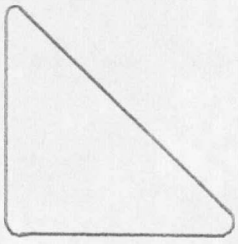
FIGURE 5



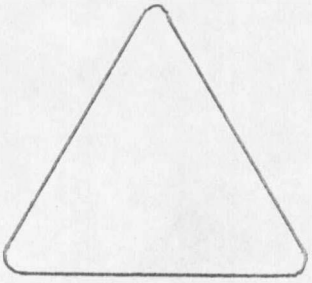
Square



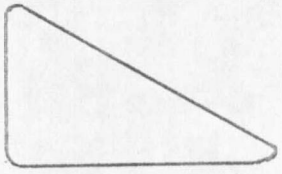
Diamond



Half-Square



Triangle



Scalene

SHAPES OF MOSAIC PIECES

Figure 4 shows the actual size of the pieces used in this test.

The test consisted of two boxes, each containing:

24 squares	36 equilaterial triangles
48 diamonds	72 scalenes
48 half-squares	

(In Pryor, only one box was used.) Each shape comes in all of the colors. The colors were strong and clear shades. They were arranged in the following order: Red, green, blue, yellow, white, and black.[38] The subject was given a tray ten and one-fourth by twelve and three-eights inches covered with a piece of white paper.

Giving the test.

When the child was to take the test, he sat at a table with the tray in front of him and the box to his left. The examiner told the child to make something. The examiner then demonstrated all the shapes and showed that each shape had all the colors. He told the child to use as much time as he wanted, although the child was usually stopped after twenty minutes if he were not finished. The examiner explained that the child would use as many or as few pieces as he wanted. He also said that the child could make something big or something little. When the child was finished, the examiner asked, "Now tell me what you have made." The examiner traced around each piece and placed an initial to show the color.[39]

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[38] Ibid., p. 34.

[39] Ames and Ilg, op. cit., pgs. 11-12.

Norms of the test.

The norms for American children were established by Dr. Ames and Dr. Ilg. They are based on children from Connecticut who were of high average to superior intelligence and whose fathers were professional or semi-professional men.[40]

Mosaic patterns could be successful in color and/or in form. Patterns were predominately successful in girls by seven-years-old; in boys, by eight. There were several levels of naming the design:[41]

1. unnamed
2. color naming
3. pieces scattered, each piece named
4. pieces scattered, whole product named
5. several pieces grouped, inaccurately named
6. several pieces grouped, slight resemblance to object named
7. object resembles object named
8. several objects, named
9. design named design
10. mere description
11. scene so named

The first six of these occurred seldom after five-years-old, although they showed increasing maturity until then. Except for the unnamed category, they did not occur after eight. Symmetry of form, not color, steadily increased. At fourteen years it reached 50%. There was a definite increase in symmetry at eight. Compactness of design was also rated, as was use of color. The order of color preference varied only

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[40] Ibid., p. 12.

[41] Ibid., p. 75.

slightly for boys and girls. (See Table 10.)

TABLE 10

Girls		Boys	
1. blue	4. green	1. blue	4. white
2. black	5. white	2. black	5. green
3. red	6. yellow	3. red	6. yellow

Color Preferences.

The use of one, two, or three colors was not too common. Girls had less concentration of color than did boys. Although the use of one color might show personality conflicts, the examiner might learn that the subject used one color because he liked it or because it had aesthetic value. Each color may, however, suggest something about emotions:[42]

Black--may suggest depression
black and white--retreat from emotional experience
black and yellow--more severe, angrier, more pathological
Blue-- quietness, coolness, coldness
Red--anger and destruction OR cheerfulness and warmth
Green--neutral
White--negation, passivity, emptiness, insecurity, deadness, depersonalization
Yellow--cheerfulness OR dreariness and dullness

White was used more in America than in Europe. Blue or black showed up most often as the only color chosen. The aggressive child who was insecure and used fighting for defense might use sharp shapes such as diamonds and wedges, usually in red and/or yellow.[43]

Certain shapes predominated at certain ages:

2-4 equilateral triangles
5-9 square
10 scalene.

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[42] Ibid., pgs. 73-74.

[43] Ibid., p. 44.

Ames and Ilg classified types of designs into four major groups with subclasses:[44]

A. Nonrepresentational designs without pattern
   1. just drop or pile
   2. scatter singly
   3. prefundamental
   4. slab
      small
      large
   5. overall

B. Nonrepresentational designs with pattern
   1. fundamental
   2. central design
   3. design along rim
   4. fills tray
      frame and item
      whole pattern
   5. separate designs

C. Representational designs
   1. object
   2. scene

D. Mixed, representational and nonrepresentational.

Prefundamentals were defined as the simple combination of two or three pieces, usually of the same shape, but not as a pattern. Slabs were found at all ages but were most common at the ten and twelve. They occurred mostly from eight to twelve (10%) and also at five. A slab was defined as a number of pieces placed together without the creation of an overall symmetrical shape.[45] By seven-years-old, slabs contained many pieces which fit, some on all sides; by nine, most pieces fit on many

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[44] Ibid., p. 47.

[45] Ibid., p. 55.

sides; by twelve, many or most pieces fit on all sides.[46] All or nearly all shapes and colors were used for slabs. The slab grew larger as the child grew older. Also the slab seemed to spread out.

Fundamentals were simple patterns made from the same types of pieces such as a circle made of triangles or a square made of squares. A central design showed a patterned plan. The frame and item looked somewhat like a picture.

Representational designs were comprised of objects and scenes; objects were the most common. From five years to eleven, representational designs occurred twice as often as nonrepresentational design with pattern which were second most frequent. Masculine objects seemed to be: Boat, car, train, airplane, rocket, arrow, and kite; feminine ones: Grass, trees, and flowers. More boys made representational objects than girls; more girls made nonrepresentational designs with pattern than boys; more girls made slabs. More boys made scenes (ages 3-8); more girls from 10-12.[47]

Several types of objects were commonly made. One was a person or people; another, a house or houses. From ages three to ten, more boys made a person than girls. Houses were the largest single specific category. There was some evidence that the child who makes a house design was frequently from a home of much tension.[48] (See Appendix B for the

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[46] Ibid., p. 218.

[47] Ibid., p. 54.

[48] Ibid., p. 44.

characteristics of mosaic patterns of given ages.)

Results of the test.

The children in Pryor mainly shrugged or said, "I don't know" in response to the query "Tell me about it." Only three children gave definite names to their creations. One second grade boy said, "It's a man" (picture #8). A second grade girl and a third grade girl made and named houses (#4, #14).[49]

The twenty-one children used a total of 672 pieces. Of those, 210 were red; 100 blue; 87 yellow; 86 white; 71 green; and 63 were black. One third grade boy used 15 pieces to make an all-red design (#15). A third grade girl used 10 all-white pieces for her design (#19). Only those two children restricted themselves to one color. Three children used three colors (#3, #14, #21); two children used four colors (#2, #20); and three children used five colors (#7, 9, 18). The majority (eleven) used all six colors. Black was the color most often excluded (nine children); green was excluded by six; yellow by five; and white and blue by three each. Red, however, was excluded by only one child, the one who made the all white design. Each grade level followed the order shown in Table 11.

Of the 627 pieces used, 163 were equilateral triangles; 159, squares; 139, scalene triangles; 84, diamonds; and 80 half-squares. Four children used only three shapes; seven used four; and ten used all

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[49]Appendix C contains the photographs of the patterns made by the children in Pryor, Montana.

TABLE 11

1st grade	2nd grade	3rd grade	4th grade
red (43)	red(86)	red (65)	red (16)
yellow (14)	green (43)	white (36)	blue (6)
black (11)	yellow (42)	blue (38)	white (4)
blue (9)	blue (41)	yellow (29)	yellow (2)
green (9)	white (39)	black (23)	green (2)
white (7)	black (29)	green (17)	black (0)

Order and Number of colors used by each grade.

five shapes. The shape most often omitted was the diamond (seven children); three omitted the square; two, each the half-square and the scalene; only one omitted the equilaterial triangle. As with color, the rank ordering of shapes varied. See Table 12.

TABLE 12

1st grade	2nd grade	3rd grade	4th grade
scalene (27)	equilateral (100)	square (61)	diamond (10)
diamond (19)	square (79)	scalene (56)	half-square (7)
half-square (18)	scalene (54)	equilateral (42)	square (6)
equilateral (16)	half-square (33)	diamond (22)	equilateral (5)
square (13)	diamond (23)	square (22)	scalene (2)

Order and Number of Shapes Used by Each Grade.

The number of pieces used in a design varied from a minimum of 7 to a maximum of 61. The median was 21; the average number, 30, varying from grade to grade. For the first graders the average was 31; for second graders, 36; for third graders, 25; and for fourth graders, 15.

Very few children overlapped pieces. A second grader overlapped two red squares (#11); a first grader overlapped two diamonds (#1); and a third grader overlapped several and stood one piece on end (#12, the piece on end is the yellow scalene marked with a dot). Those children overlapping pieces used more than the average number. They used 49, 53, and 58 pieces respectively.

Although the paper used in Pryor was slightly smaller than the tray it was on, most children were restricted by the edges of the paper. Those not restricted by the paper were restricted by the tray. Those placing pieces either partially or mostly off the edge of the paper included #6, 8, 11, 12, and 21. Twenty children used the paper horizontally (as it was presented); but one fourth grader, #21, turned her paper vertically to make the design.

Approximately half the children made patterns resembling houses, usually a square capped by a triangle. (See #3, 4, 5, 7, 14, 15, 17, 18, and 20). One child, #19, made what appears to be a more complicated house. Two (#11, 16) made fundamental patterns. A horizontal pattern of rows can be seen in #6, 10, and 12. Only one child made a man, #8.

Symmetry was started by several children, but was not successfully completed. However, some children did successfully deal with symmetry, either in form or in color. Three children (#17, 18, 20) made designs with symmetry of form. Four also achieved symmetry of form and color (#2, 8, 19, and 21). The boy who made #8 took two pieces out of the box at a time, both in his left hand. He then transferred one to his right hand and carefully placed them in position at the same time. The child who made #16 was very careful with the coloring in her pinwheel. She used two of every color. Of the twenty-one children, three started to work with one design and changed it to another before being satisfied.

None of the children needed prompting to get started; only two

needed it before finishing. Most of the children knew what they were after and concentrated very hard on making their product. Most of them said very little, especially about what they were doing. They worked quickly, quietly, and shrugged when asked about their product.

The examiner was not qualified enough to score this test based on age. Thus, no developmental ages were given.

CHAPTER VI

SELECTED TASKS FROM PIAGET

Description of tasks.

Jean Piaget is a Swiss philosopher who has made rather extensive studies of children and has contributed to the understanding of intellectual development of children. He believes that intellectual development proceeds through given stages in a definite order. However, the appearance of these stages in time varies with the individual and his society; thus, the average chronological age during which these stages appear also varies.[50] Several psychologists, such as Elkind[51], have attempted to replicate Piaget's studies using American children. They have found close correlation in the average age between American children and those from Geneva for the various stages.

Piaget ascribed certain characteristics to each of his stages of development. Because of the chronological ages of the children used in this study, only three of Piaget's stages are pertinent. They are: Pre-operational representation, concrete operations, and formal or hypothetic-deductive operations.[52] Piaget believes that the development

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[50]Ripple, Richard E. and Verne N. Rockcastle (ed.), Piaget Rediscovered: A Report on the Conference on Cognitive Studies and Curriculum Development, March, 1964, p. 1.

[51]Eklind, D., "The Development of Quantitative Thinking: A Systematic Replication of Piaget's Studies," Journal of Genetic Psychology, 98:36-46, March, 1961. Also "Children's Discovery of Mass, Weight, and Volume: Piaget Replication Study II," Journal of Genetic Psychology 98:219-227, June, 1961.

[52]Ripple, op. cit., p. 9.

from one stage to the next is produced by four factors: Maturation, experience, social transmission, and equilibrium or self-regulation.[53] To Piaget, equilibrium is the most important factor because it is active, not passive. The organism does something to and for itself.

Intellectual development and learning are different things. Duckworth quotes Piaget as saying, "Good pedogogy can have an effect on this development."[54] However, Piaget makes a distinction between intellectual development and learning. To him, development of knowledge is a spontaneous process involving the whole being. Learning, on the other hand, is provoked by situations dealing with one problem or structure.[55] Thus, although good schools may affect growth, such schools cannot greatly hasten the passage through the stages. Also, the good school will pay some attention to the stages and not try to teach at a level far above the actual development of its pupils.

Three tasks were chosen for the study at Pryor, Montana. The first task was that of Conservation of Number or Spontaneous Correspondence--Cardinal Value of Sets.[56] The second task was that of evolving the Law of Floating Bodies or a Problem in Classifying and

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[53] Ibid., p. 10.

[54] Ibid., p. 1

[55] Ibid., p. 8

[56] Piaget, Jean, The Child's Conception of Number, New York: The Humanities Press Inc., 1952, pgs. 65-95.

Ordering Objects.[57] The third task was that of Conservation of Continuous Quantity (Liquid).[58]

Spontaneous Correspondence. For Spontaneous Correspondence, Counting, the child is shown a given number of objects and told to pick out the same number. In Pryor these objects were colored chips--red, blue, and white. There were five types of figures used by Piaget: Random order, neither touching nor overlapping; two parallel rows; closed figures not dependent on a set number of counters; closed figures whose shapes do depend on a set number; and more complex closed figures such as a rhombus.[59] The following were included at Pryor: (1) Seven blue chips arranged randomly, (2) nine blue chips arranged in a triangle, (3) five red chips arranged in a circle, (4) seven shite chips in a straight line, and (5) the same seven white chips in a straight line moved farther apart.

Piaget found three main stages of intellectual development for this task: Stage I--global comparison, Stage II--one-to-one correspondence or intuitive correspondence, and Stage III--an exact and lasting equivalence or operational correspondence.

During Stage I (before five-years-old) there is only an imitation of the configuration of the model with no attempt at exact quantity.

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[57]Inhelder, Barbell and Jean Piaget, The Growth of Logical Thinking from Childhood to Adolescence, Basic Books, Inc., 1958, p. 20-35.

[58]Piaget, op. cit., pgs. 3-24.

[59]Ibid., p. 66.

Even the copy is only roughly correct. Because the child has no precise notion of cardinal number, he does not equate numbers. He is more concerned with such things as length and diameter. When working with a single row of counters, the child makes his judgments on either length of the row or the density of the objects, not both. When the row is made longer or shorter, he restores correspondence by adding or removing objects.

In Stage II (about five to six years old) the child has one-to-one correspondence and uses that to reproduce the model. However, when the model is distorted, he loses the correspondence. When working with a single row, the child puts down the same number of objects contained in the model; so, he truly perceives correspondence. When the row is made either longer or shorter, he says the longer row has more objects in it. However, in order to restore correspondence, the child merely moves his chips into the proper positions. Therefore, the child is comparing only certain criteria and is showing a beginning of initial stages of reversibility in thought.

During Stage III (six or older) the child has developed an exact and lasting equivalence. His system of thinking is now truly reversible. He uses spontaneous operations as a check on his work. He may even destroy or distort the figure and make it into a series.[60] When confronted by a single row, the child expresses numerical equality. He

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[60] Ibid., p. 74.

may or may not make a replica of the model, but he points or counts so as to maintain the correspondence. He considers both the length of the line and the density of the objects.

Piaget summarizes some of the kinds of thinking for this task as in Table 13. A child in Stage II acknowledges the first four. The child in Stage II uses all of them.[61]

TABLE 13

1. Equal lengths and equal density, the sets are the same.
2. Greater length and greater density, or smaller length and smaller density, one set has more, or less, elements than the other.
3. Equal length and greater density, or equal length and smaller density, one row contains more, or less, elements than the other.
4. Inverse lengths and densities in (3), the conclusion the same as in (3).
5. Greater length and smaller density, or greater density and smaller length, the number of elements in one series is larger and smaller than in the other and therefore equal.
6. (a). Equal number multiplied by greater length implies smaller density, and equal number multiplied by smaller density implies greater length.
6. (b). Equal number multiplied by greater density implies smaller length, and equal number multiplied by smaller density implies greater length.

Kinds of Thinking.

Classifying and ordering floating bodies. The second task, that of classifying objects as to whether or not they will float, was reported by Inhelder and Piaget.[62] The child was shown several objects. In Pryor these included two sizes of corks, two sizes of keys, two sizes of nails, a plastic boat, different sizes and shapes of wood, a needle,

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[61] Ibid., p. 91.

[62] Inhelder and Piaget, op. cit.

a candle, pebbles of different sizes, a spoon, an aluminum lid, and a penny. The child was then asked, "What will happen when these are put in the water?" After he classified all of them, he was asked to explain the basis for each. Next the child experimented by putting each thing in the water. Finally he was asked to summarize his observations. The child was to evolve a law including density (the relation of weight to volume) and specific gravity--"The relation between the weight of the object (its density if it is solid or the weight of its matter plus that of the air it contains) and an equivalent volume of water."[63]

Stage I, which for this task lasts until about seven or eight, is one of often multiple and contradictory formulations. Substage IA is truly preoperational. In this substage, the child does not even divide the objects into floating and non-floating because his answers about a given object are different at different times. To him, the properties are not constant, even after he is shown. By Substage IB the child tries to classify objects into floating and non-floating; however, he is not very successful. He uses such classifications as small-light and big-heavy.

Stage II is reached about seven to nine years of age. During this stage the child tries to remove the main contradictions, such as some little things sink and some big things float. Substage IIA is the beginning of the concept of specific gravity. The child can thus make

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[63] Ibid., p. 21.

three classes: Light, heavy, and those of specific gravity. He also discovers that small objects are not always light and conversely large objects are not always heavy. This discovery permits four classes: Small-light, small-heavy, large-light, and large-heavy. Despite the improvements from Substage IB, there are still some contradictions. Substage IIB does not even begin until about age nine. Then a "serial ordering of weights between objects of the same volume"[64] occurs. The child goes beyond to explain in simple terms such as iron is heavy or wood is light. Specific gravity may be expressed by saying the object is full.[65] The child's classifications are by specific gravity, not absolute weight. Piaget says "Conservation of volume is not worked out conceptually before the beginnings of formal level--i.e., toward 11-12 years."[66]

Conservation of continuous quantity (liquid). The third task was that of Conservation of Continuous Quantity (Liquid). The child was given two large, equal cylinders full of water, A_1 and A_2. Water from A_1 was poured into two smaller, equal cylinders, B_1 and B_2. The child was asked if A_2 were the same as B_1 and B_2. Water from B_1 and B_2 was poured into four smaller cylinders, C_1, C_2, C_3, and C_4. These were poured into something of a different shape such as a dish or a tube.

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[64] Ibid., p. 31.

[65] Ibid., p. 32.

[66] Ibid., p. 33.

The child was questioned as to whether the amount of liquid changed during the exhibitions.

During Stage I (before five years) the child believes it is normal for the amount of water to vary according to the size and numbers of containers into which the liquid is poured. Sometimes the differences in height of the liquid is considered; sometimes the difference in numbers of containers; but only one of these is considered each time, not both.

By Stage II (five to six-and-a-half years) the child can sometimes recognize conservation. He knows pouring one big glass into two little ones does not change the amount of liquid; but pouring into three or more confuses him. He tries to reconcile two or more of the differences, such as height and width; but he is not too successful. He can see differences in level and width. When these differences are slight, he can reconcile them; but when the differences are great, he becomes confused.

When the child reaches Stage III (about six or seven) he almost immediately says the quantities of liquid are the same regardless of the number or nature of the changes made. He knows it comes from the same glass. Table 14 gives a brief description of each stage for each task.

Results of the tasks.

Conservation of Numbers. On Task I, Counting, eleven children were in Stage III (6+). The eleven included one first grader, four second graders, five third graders, and one fourth grader. Seven were in

TABLE 14

1. Conservation of Numbers

Stage I	Before 5	Global comparisons--roughly imitates the form of the model
Stage II	5-6	Intuitive correspondence--loses one-to-one correspondence when model is distorted
Stage III	6+	Operational Correspondence--exact and lasting equivalence

2. Classifying and Ordering--Floating Bodies

Stage I	Before 7	Multiple and contradictory formulations
Substage IA		Does not divide into floating and non-floating
Substage IB		Tries to classify into floating and non-floating; not wholly successful
Stage II	7-9	Tries to remove main contradictions
Substage IIA		Beginning of specific gravity concept
Substage IIB	9+	Ordering of weights and volumes
Stage III	11+	Formal level

3. Conservation of Continuous Quantities (Liquid)

Stage I	Before 5	Quantity increases or decreases according to size and numbers of containers
Stage II	5-6$\frac{1}{2}$	Conservation recognized in some cases but not in all
Stage III	7+	Recognizes conservation completely and successfully

STAGES FOR EACH OF PIAGET'S TASKS

Stage II (5-6): One first, two second, three third, and one fourth grader. Only three were in Stage I (below 5), including one first and two second graders. In all cases there were more correct than incorrect replies. Of the five parts, two were almost always correct. Only one child missed the five red chips in a circle, while two children missed the seven white chips in a row. The nine blue chips in a triangle was completely missed by five children; six missed the seven blue chips with no form; and eight missed the seven white in a row when that row was distorted.

When asked if the numbers were the same and how they could tell, the children in Stage I answered with such replies as with our eyesight, 'cause I know, we put them down the same, or I don't know. By Stage II the replies were more likely to be 'cause I counted, 'cause we have the same, or 'cause they look alike. In Stage III numbers were given: Seven there and seven here, nine of 'em, mine is seven so is yours, five in each, or I counted. Children in Stage I and II replied incorrectly when the row of seven shite chips was spread out. Their answers included: With our eyes, 'cause it's wider, not the same 'cuz you moved them, yours have spaces, or 'cause mine are close to each other. By Stage III with lasting correspondence, the replies included: Still seven and seven, still the same, or different spaces but the same number. Many of the children in Stage III used only the same number without considering color or shape of the model.

Classifying and ordering floating bodies. On the second task,

Floating Bodies, two children were in Stage IA (5), eighteen were in Stage IB (6), and one was in Stage IIA (7-8). The two in Stage IA were a second grader and a third grader. The one in Stage IIA was a third grade boy. Of the sixteen objects the children were to classify, six floated, eight sank, and two could do either. Two objects were classified incorrectly more often than correctly. Eleven of fifteen children said the candle would sink, while ten of eighteen said the spoon would float. Approximately a third of the children misclassified the small key, small nail, and large wood. About a fourth said the large cork would sink. About a sixth of the children responded incorrectly about the boat and the small wood. The ones missed least often were: The small rock, the large key, the penny, the large nail, the small cork, and the large rock. The lid and needle could either sink or float, although sinking was the more likely. Fifteen of twenty-one children said the lid would sink, while nine of eighteen said the needle would sink.

The two children in Stage IA did not try to classify the objects. One said they would all sink, the other, that they would all drown. In Stage IB the children tried to classify. They said things would float because they were small, not heavy, light, skinny, or thin. They said things would sink becuase they were heavy, "too light to stay on top," kind of heavy, fat, or a little bit too heavy. The boy in Stage IIA gave more sophisticated reasons such as the corks would float because they were made of wood; and the candle, because it was made of wax. He said the rocks would sink because rocks could not float.

The children often used other words to mean float. The words included sail, on top, stay up there, top, go up, on the water, and not sink. Besides sink, they used drown, get down, go to the bottom, bottom, go down, drop to bottom, fall down, not float, and under.

Conservation of continuous quantity. The third task, that of conservation of water, seemed to be the most difficult for the children. Twelve of the twenty-one children were in Stage I (below 5); five were in Stage II ($5\frac{1}{2}$-6); and only four were in Stage III (6+). There were three second and two third graders in Stage II. In Stage III there were one second, one fourth, and two third graders. Both children who had been in Stage IA for Floating Bodies were in Stage III on this task. Only seven items were given to at least fifteen children. The first time the children were asked if one large glassful of water was the same as another large glassful, three of the seventeen said "no." Six items later the same question was asked; that time all of the children agreed that the two glasses held the same amount of water. When asked if four small glasses equaled one large one, eight of sixteen correctly answered with yes. On the other four items, the number of incorrect responses was greater than the number of correct ones. Nine of fifteen replied incorrectly to one tube and one small glass equaled one large glass; the same number also incorrectly responded to one dish equaled a large glassful. Thirteen of twenty said one medium and two small did not equal one large (incorrect); and thirteen of twenty-one said two medium did not equal one large. In all cases the children observed the pouring from containers into other containers.

The children in Stage I had two reasons for saying there was inequality, either number of containers or height of water in the containers. For the number of containers they said things such as: You poured into two, one big and two little, you poured into four little glasses, and I have two and you have one. Height was expressed also: One's taller, one's small and one's big, lines are even, not big enough, one big and two little, one's half but the other is quite full, the amount of water, kind of flat, these are little and yours are big, and mine's bigger (or littler). In Stage II, sometimes the children understood the concept; and sometimes they did not. Some answers included: You poured half in here and half in there; and yes, but I don't know why. By Stage III conservation was well established. The children said you're using the same water from the same glass, you poured into both, and you poured from the big one.

CHAPTER VII

STATISTICAL INFORMATION

By running the Missing Variables Program to find correlations between the tests, several things became apparent. First, few of the tests correlated with each other. Those that correlated at the beginning of the year did not at the end of the year; and vice versa for those given both at the beginning of the year and the end. Many of the correlations contained one of the three tests dependent on ability to understand and to use English words: Word Knowledge, Word Discrimination, and Reading, which are all subtests of the Metropolitan Achievement Test.

Because four grades were involved, the number of children taking tests varied. Table 15 shows the statistically significant correlations at the .05 level (5% probability of occurring by chance) for the varying numbers of children.

TABLE 15

Number	Significant Correlation
3	.805
6	.622
10	.497
11	.476
16	.400
17	.389
21	.352

Significant correlations

By using each test and subtest from the beginning and the end of the year, there were twenty-eight factors. There were eighty-seven correlations that had to be considered. They included just tests given at the beginning of the year correlated only with others given at the beginning, and those given at the end correlated only with others given

at the end of the year. They did not include tests given at the beginning correlated with tests given at the end; the subtests of the Metropolitan correlated with each other; nor a test given at the beginning correlated with the same test given at the end. Of the eighty-seven correlations considered, twelve were statistically significant.[67]

Several of the tests and subtests did not correlate significantly with any test. These included Usage, Punctuation and Capitalization, Language Total, Arithmetic Total, First Grade Total (which are all subtests of the Metropolitan), and Piaget's task of Conservation of Water.

Two tests correlated significantly only once: At the beginning of the year, Spelling correlated with the Gesell Developmental Examination (.497, 17 children). Arithmetical Computation correlated with the Gesell (.583, 16 children) at the end of the year. Problem Solving and Concepts correlated significantly twice: At the beginning of the year it correlated with the Gesell (.547, 17 children); and at the end of the year it correlated with Piaget's task of Counting (.394, 17 children).

At the beginning of the year, I.Q. did not correlate highly with any test. By the end of the year, however, it correlated significantly with four other tests. It correlated with Word Knowledge (.603, 17 children), with Word Discrimination (.457, 17 children), with Reading (.501, 17 children), and with Piaget's Counting task (.428, 21 children).

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[67]Appendix D contains the eight-seven correlations considered.

It did not correlate highly with the other achievement tests, the Gesell, Piaget's task of Floating Bodies, nor Piaget's task of Conservation of Water.

The Gesell Developmental Examination correlated significantly with five tests: At the beginning of the year it correlated with Spelling (.497, 17 children) and with Problem Solving and Concepts (.547, 17 children). At the end of the year it correlated with Word Discrimination (.444, 17 children), with Arithmetic Computation (.583, 16 children), and with Piaget's Floating Bodies task (.357, 21 children). It did not correlate with other achievement tests, I.Q., Piaget's task of Counting, nor the task of Conservation of Water.

Piaget's task of Counting also correlated significantly with four other tests, all at the end of the year, because that was the only time Piaget's tasks were given. This task correlated with I.Q. (.428, 21 children), with Word Discrimination (.399, 17 children), and with Problem Solving and Concepts (.394, 17 children). It did not correlate significantly with the Gesell, other achievement tests, the task of Floating Bodies, nor the task of Conservation of Water.

Of the sixteen tests and subtests, twelve were given at both the beginning and the end of the year. In each case the mean rose from almost four points to slightly under fifteen points. The greatest increase in Standard Deviation was 7.82 while the greatest decrease was 6.52.

The average of the subtests of the Metropolitan were ranked as follows: Word Knowledge, Computation, Arithmetic Total, Spelling,

Language Total, Punctuation and Capitalization, Usage, Problem Solving and Concepts, Word Discrimination, and Reading. Table 16 shows the scores at the beginning of the year and those at the end.

TABLE 16

	Beginning of the Year			End of the Year		
	#	Mean	Stand. Dev.	#	Mean	Stand. Dev.
I.Q.	21	82.52	12.09	21	86.14	12.20
Gesell	21	6.91	3.91	21	8.45	3.50
Word Knowledge	16	25.81	11.91	17	40.58	6.79
Word Discrimination	16	30.12	13.03	17	35.76	6.51
Reading	17	30.94	6.28	17	35.76	9.55
Spelling	17	30.23	12.82	17	39.76	9.42
Usage	11	39.27	13.19	10	46.39	6.91
Punctuation & Capitalization	11	32.27	5.22	10	40.79	5.03
Language Total	11	33.09	8.16	10	42.00	5.96
Problem Solving & Concepts	17	30.64	5.14	17	37.64	10.12
Computation	7	28.58	3.71	16	38.62	11.53
Arithmetic Total	6	26.33	2.62	6	35.66	9.56

Tests: Means and Standard Deviations

As was expected, after a year of Schooling, all achievement items increased. When a child learns, his achievement score rises. Thus, these children learned and their scores rose. To the investigator, the large gain in Word Knowledge indicated a gain in understanding the English language. In most cases the children grew closer in their range of understanding as shown by a decrease in Standard Deviation. Only in Reading and the arithmetic skills did the range of knowledge become greater from the beginning to the end of the year.

There was also a gain in mean on the Gesell Developmental Exam. Because this test is a measure of maturation and development, an increase was expected. The figures were more significant than they appeared, because an increase of one point in the mean denoted an increase of one

year developmental age. The children had several months to mature between the two times the test was given. The Gesell should not be highly correlated with I.Q. since intelligence and maturity are not necessarily related to each other. Therefore, neither at the beginning nor at the end of the year did these two tests correlate significantly. At the beginning of the year the correlation was .314 while at the end it was .175. The Gesell correlated significantly with only one of Piaget's three tasks, Floating Bodies. The necessary correlation for significance was .352 or higher. The Gesell correlated with Counting at .341; with Conservation of Water, .302. The only arithmetical part of the Gesell was writing numbers and copying figures. The investigator had no explanation for the correlation of the Gesell and Computation. Both Problem Solving and Concepts and the Gesell required thinking. Perhaps a similar kind of thinking explained their relationship. Although the Gesell is supposed to be a test not restricted to one culture, it was given in English and required English responses. Perhaps the quality of response helped explain the relation of the Gesell to the verbal items of Spelling and Word Discrimination. The Gesell, as a test of developmental age, should not necessarily correlate very highly with achievement. With the four exceptions discussed above, it did not.

Each of Piaget's tasks was to measure development in relation to thinking. However, for the most part the tasks did not correlate highly with anything, not even with each other. Counting and Floating Bodies correlated at only .020; Counting and Conservation of Water at only .146; Floating Bodies and Conservation of Water at -.007. Only Floating

Bodies correlated significantly with the Gesell. Conservation of Water correlated with no test. Counting correlated with I.Q. perhaps because of similar discriminations required to answer. Since Counting depends on thinking in arithmetical terms, its correlation to Problem Solving and Concepts was not unexpected. However, the correlations between Counting and both Word Knowledge and Word Discrimination were not expected.

CHAPTER VIII

SUMMARY

This study was based on one year's work with Crow Indian children, grades one through four, at Pryor, Montana. Five kinds of tests were given and evaluated. They were: The Stanford Binet Intelligence Scale, the Metropolitan Achievement Tests, the Gesell Developmental Examination, the Lowenfeld Mosaic, and three tasks selected from Piaget. The first three tests listed were given twice, at both the beginning and end of the year. The last two listed were given only at the end of the year.

On the Stanford Binet Intelligence Scale, the children had trouble with vocabulary, differences, opposite analogies, comprehension, repeating digits, and verbal absurdities. They did fairly well with number concepts, copying the diamond, similarities and differences, rhymes, and memory of design. I.Q. scores ranged from 68 to 116 with an average of 82.52 in October, increasing to 86.14 in May.

The Metropolitan Achievement Tests were given twice; the Readiness test, once. All three first graders received a score of "B" on the Readiness Test given at the end of the year. All second graders increased in Word Knowledge, Spelling, and arithmetic, especially Concepts and Problem Solving. They made very small gains in Reading and Word Discrimination. All of these second grade tests were subtests of the Metropolitan Achievement Test Primary Battery II. In Arithmetic and Word Knowledge the second graders in Pryor were close to the national averages for their grade. The third grade class, as a whole, was closest to the national averages for their grade than any other grade in this study.

In arithmetic, Computation, the class was right where it belonged--stanine 6, grade equivalent 3.8. The largest gains were in Word Knowledge, Computation, and Punctuation and Capitalization. Because there were only two fourth graders, averages meant little for that grade. One child ranged in stanines from 2 to 6 and in grade equivalents from 3.0 to 5.0. The other ranged in stanines from 1 to 3 and in grade equivalents from 1.8 to 3.8. For grades two, three, and four, arithmetic, especially Computation, had the highest scores. Spelling was also high. The lowest scores were in Word Discrimination, Problem Solving and Concepts, and Reading. These findings agreed with those Coombs found for pupils in higher grades.

The Gesell Developmental Examination is a fairly recent test. It measures the child's developmental level in half-year intervals. The test, as it was given at Pryor, consisted of these parts: The initial interview, the paper and pencil tests, the copy forms, and the Incomplete Man. The examiners described the children, as a group, as eager yet restless. Many children did not know their birth date and did not remember much about a party. Almost no child had any concept of jobs or occupations. Most children wrote first and last names. Only one child wrote the whole date, and another the entire address. Most children wrote the numbers to 20 in a horizontal line. More than half the children were reasonably successful with the copy forms; the three-dimensional forms seemed the most difficult. Most children restricted themselves to one side of the paper, many to less than half a page. When asked about

the Incomplete Man, most children said it was either a boy or a man. Most did the leg first, then the arm. Most children said they could tell how the figure felt by some part of his face. The scores for the children on this test were as much as three years lower than chronological age. There were no scores the same as, or higher than, chronological age.

The Lowenfeld Mosaic was a test the children thoroughly enjoyed. Photographs of their products are in Appendix C. Red was the color most commonly used in this test. Black was the color most often excluded. Although most children merely shrugged their shoulders and said "I don't know" when asked to tell of their product, many made designs which appeared to be houses. The average number of pieces used was thirty. Symmetry was started by several children, although only a few were successful.

On Piaget's task of Counting, most (eleven) children were in Stage III. They had lasting and exact correspondence. They used only numbers to replicate the model and did not necessarily consider shape or color. On the task of Classifying Floating Bodies most children (eighteen) were in Stage IB, that of trying to classify objects into floating and non-floating. However, they were not completely successful. They said something would float because it was light, skinny, or small. Also they said things would sink because they were heavy or big. The task of Conservation of Continuous Quantities (liquid) seemed the hardest of the three tasks. Most children (twelve) were in Stage I, saying there was a difference because of numbers of containers or because of height of

water in the containers.

Correlations were run for the various tests. The mean on each test given at both the beginning and the end of the year rose. The increases were expected for the achievement tests and the Gesell Developmental Exam. Because Piaget's tasks and the Gesell both measure development, it was expected these would correlate. However, the Gesell correlated only with the Floating Bodies task. The tasks did not even correlate amongst themselves. The correlation of the developmental tests with achievement tests was not expected. However, the Gesell correlated highly with Word Discrimination, Problem Solving and Concepts, Computation, and Spelling. Piaget's task of Counting correlated significantly with Word Knowledge, Word Discrimination, and Problem Solving and Concepts. The correlation of I.Q. and Counting was not expected. The significant correlations of I.Q. with Word Knowledge, Word Discrimination, and Reading were not unexpected because all of them rely heavily on knowledge of and ability to use the English langauge.

Several questions were raised by this study. Only further research, using a larger number of Indian children, can answer them. Since Piaget's tasks are based on thinking and developmental age, why are there no significant correlations with each other? With the Gesell? Why, if Piaget's tasks and the Gesell measure developmental age, are they significantly correlated with skills dealing with knowledge of English? Teachers of young Indian children need to know more about achievement for more children than merely their own classes. The children at Pryor were found to be a great deal younger developmentally than

chronologically. Is this general? What can be done about it? How do schools deal with this type of child?

This study was done as a very broad study dealing with small numbers of children. In this respect it is a pilot study rather than one dealing with final and definite conclusions.

CHAPTER IX

INVESTIGATOR'S OPINIONS

It was difficult for the investigator to believe that the children used in this study were as far from the norms as they appeared to be, based on test scores. In most respects the investigator felt that, although the children were of a different culture, they were average.

The I.Q. scores placed the children as much as 30 points below average. Only a very few children scored average. However, after teaching these children for one year, listening to them, hearing questions from them, and talking with them, the investigator could not be convinced these are retarded children or even slow learners. There were too many times the children reacted intelligently for the test scores to be a true indication. The investigator believed the reason scores were so low was because the test was devised for "middle-class" American children.

The Metropolitan Achievement Tests probably showed most accurately where the children were. They did achieve much below grade level for several reasons: Poor nutrition, lack of sleep, little knowledge of English, little parental concern toward education, and inappropriateness of textbooks and school work. The children were usually curious; but their curiosity had very little to do with academic work. However, they were usually very eager for art, music, and physical activities. They also rapidly learned computation skills. Perhaps a cultivation of interest in reading would benefit the entire curriculm. The only times reading skills were thoroughly enjoyed by the children were in more

creative things such as experience charts, writing a story about a picture drawn by the child, and retelling stories from textbooks. It is too bad most of the children have to miss so much of the "world" because of lack of interest in and skills for reading.

Since the time the Gesell Developmental Examinations used in this study were scored, several interesting things have happened. After the tests were scored at Montana State University, some of them were sent to the Gesell Institute. There someone, after examining them, said the scores were too high. Several months later another person from the Institute rescored some of the tests, saying they were scored too low. The next year Dr. Ilg came to Montana from the Institute and gave tests to some Crow Indian children. She said they were average developmentally in most areas, and that they were above average in a few areas. The investigator felt that in most respects the children were average developmentally. However, that they came from another culture was evident in many of their responses on the test and in the classroom. Because of a different value system, they were not as quiet and studious as many children their age. However, in physical abilities and activities and in social relationships they were very normal.

The Lowenfeld Mosaic was possibly the most interesting and least informative for the investigator. Since this test determines something about personality, the products of three children (#9, 15, & 19) can be considered. The child making #9 used many pointed shapes. This might

point to an insecure child who uses fighting as a defense.[68] This child often started fights and was very bossy with the other children. Red can be the color for aggression.[69] The child who made #15 was a hyper-active, aggressive child frequently involved in battles with other children or the teacher. White might show aggression or withdrawal.[70] The child who made #19 was aggressive, but also very insecure, often clamoring, "How come you don't help me?" to the teacher. This child frequently fell asleep in class and often cried, once for twenty minutes. It amazed the investigator that few children made any "pretty" designs. The lack of pattern was also unexpected. Most of them did beautiful artwork.

The responses of the children on Piaget's tasks were very puzzling. It seemed as if many children did not care and were not interested enough to try. The investigator, as teacher, felt that many of the children could have done better. Often the child scoring low on one task would be high on another. It seems that a child's responses should be on the same level if he is really operating at his developmental age. It was unfortunate this particular set of tasks was given only once. Perhaps giving it twice would have given a truer picture of the children's performances.

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[68] Ames and Ilg, op. cit., p. 44.

[69] Ibid., pgs. 72-74.

[70] Ibid.

The investigator, thus, felt that the scores on most of these tests were not accurate. She felt, except on the achievement tests, the children were performing much above the level shown by test scores.

APPENDIXES

APPENDIX A: A Report on Coombs Et Al. Study of Achievement

In the early 1950's a study on school achievement for grades four through twelve, based on the California Achievement Tests, was conducted by Coombs and others. This study compared Indian children with rural white children from the same geographic area. Three types of schools were used: Mission, Federal (Bureau of Indian Affairs), and public. Six Bureau of Indian Affairs divisions were used. They were:

(1) Anadarko--West Oklahoma and Kansas,
(2) Billings--Montana and Wyoming,
(3) Aberdeen--North Dakota, South Dakota, and Nebraska,
(4) Muskogee--east Oklahoma and Mississippi,
(5) Albequerque--New Mexico and Colorado
(6) Phoenix--Arizona (excluding the Navaho Indians).

The Billings area was tested in 1953. All of the reservations in Montana and Wyoming were used. The following schools from the Crow Indian Reservation in the Billings area were used:

(1) St. Charles Mission (at Pryor)
(2) St. Xavier Mission
(3) Crow Agency Public School
(4) Lodge Grass Public School
(5) Pryor Public School
(6) St. Xavier Public School
(7) Wyola Public School

No primary grades were used because the researchers did not know of a suitable test which could be machine scored. Also they felt the results would not be valid nor reliable. All students in the proper grades in each school chosen were tested.

In the Billings area the study consisted of 40.6% White and 59.4% Indian. Although the percentage of whites and Indians was closer for the Billings area than for the other areas, more students (80%) chose

friends of the same race.[71]

For this study, the average age was based on nine or ten for a fourth grader with one year of age added for each successive grade level. Those pupils who were overaged tended to score lower than those at age. Those who were underaged tended to be whites and to score higher than those at age.[72] Indian pupils averaged six months older than whites in the public schools. Those overaged were usually boys; while those underaged were usually girls.

Fourth graders were more alike in achievement than at any succeeding grade level. The researchers also found that when a new test was introduced such as at ninth grade, white and Indian pupils scored more alike than at either the preceding or following grade level. In all grades, the California Achievement Test was used to test reading, arithmetic, and language. The Indian pupils scored highest in spelling and lowest in reading vocabulary. They scored next highest in arithmetic fundamentals and next lowest in arithmetical reasoning.[73]

A consistent rank of achievement was found:

(1) White pupils in public schools,
(2) Indian pupils in public schools,
(3) Indian pupils in federal schools,
(4) Indian pupils in mission schools.

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[71]Because Catholic Mission schools and B.I.A. schools enroll almost all Indian pupils, this part of the study was based on public schools.

[72]Coombs, op. cit. p. 122.

[73]Ibid., p. 63.

Since federal schools are supposed to be in areas not served by public schools and since mission schools also are in the same kinds of areas, those pupils in public schools are likely to be more acculturated.[74] The Billings area followed the heirarchy of achievement exactly. Also in the Billings area no significant difference in achievement between mostly Indian and $\frac{1}{2}$ Indian-$\frac{1}{2}$ white school population was found.[75]

The areas ranked in achievement as follows:

(1) Anadarko
(2) Billings
(3) Aberdeen
(4) Muskogee
(5) Pueblo
(6) Albequerque

There was no significant difference between the Anadarko and Billings areas.[76] However, although the Billings area Indians scored second highest of the six areas tested, they compared less favorably to their rural white neighbors than any of the other areas.

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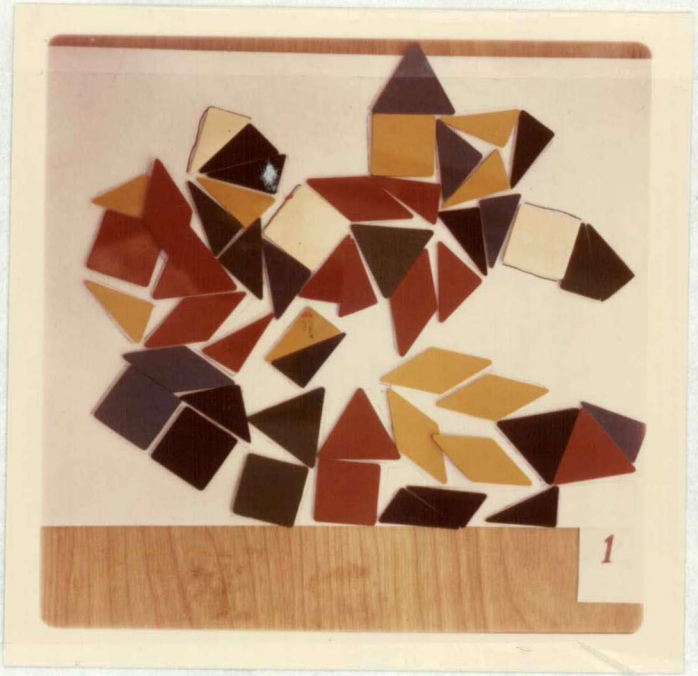
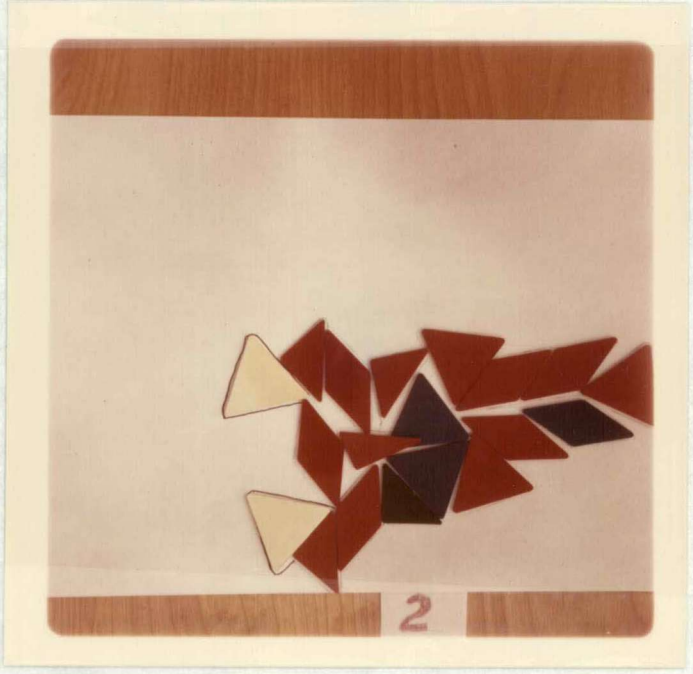
[74] Ibid., p. 62.

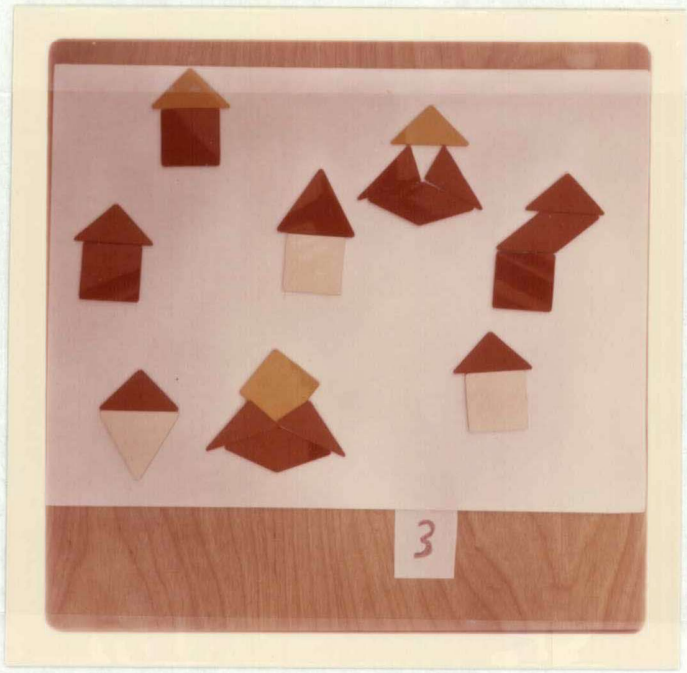
[75] Ibid., p. 133.

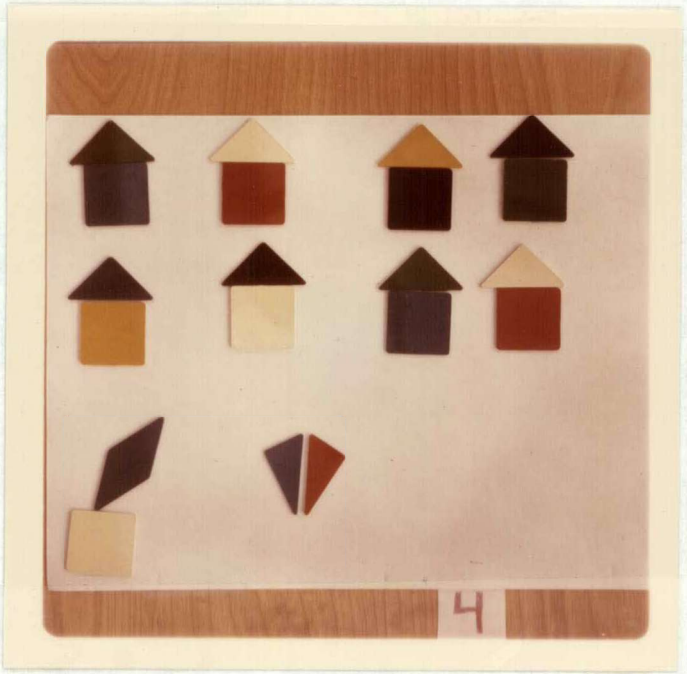
[76] Ibid., p. 3.

APPENDIX C: PHOTOGRAPHS OF LOWENFELD MOSAICS






3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