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THE UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

A STUDY OF SOME FACTORS IN THE BENDER-GESTALT REPRODUCTIONS OF READER AND NON-READER CHILDREN

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

degree of

DOCTOR OF PHILOSOPHY

BY

ROBERT E. PARRISH

Norman, Oklahoma

1962

A STUDY OF SOME FACTORS IN THE BENDER-GESTALT REPRODUCTIONS

OF READER AND NON-READER CHILDREN

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A STUDY OF SOME FACTORS IN THE BENDER-GESTALT REPRODUCTIONS OF READERS AND NON-READERS

CHAPTER I

THEORY AND PROBLEM

Introduction

In the past several years a number of testing techniques have been developed to aid the psychologist in the evaluation and diagnosis of one's personality functioning. Perception of form was investigated by several workers with psychotics during the 1930's and interest was centered on the level of receptor thresholds in these patients, but when the thresholds were discovered to be about the same as normals, this approach was abandoned.[1] The Bender-Gestalt-Motor Test was introduced by Lauretta Bender in 1938 and includes the copying of nine simple geometric designs.[2]

Though the Bender-Gestalt-Test currently has wide clinical use, few attempts have been made to develop an efficient quantified scoring system particularly at the lower age levels. The lack of an efficient

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[1]F. Y. Billingslea, "The Bender-Gestalt: An Objective Scoring Method and Validating Data," Journal of Clinical Psychology, Clinical Psychology Monograph, No. 1, 1948, p. 2.

[2]Lauretta Bender, "A Visual-Motor Gestalt Test and its Clinical Use." Research Monograph No. 3, American Orthopsychiatric Association, 1938.

scoring system at the lower age levels makes the clinical use of the Bender-Gestalt Test a hazardous proposition at best. Although Bender suggested an approach toward quantifying children's records, the quantification work that has been done deals almost solely with the records of adults. Billingslea[3], Gobetz[4], Lonstein[5], and Pascal and Suttell[6] have involved themselves with the standardization and quantification of the test on an adult population. In this connection Pascal and Suttell state: "Our purpose at this point, however, is not to standardize the test for children as a basis for qualitative clinical judgment of adult records."[7]

The deviations in the records of normal children often bear striking resemblance to those found in adult clinical prototypes. The processes involved in children's response patterns, therefore, must need be treated and interpreted in different ways from adults. Because of the paucity of pertinent research undertakings in this area, the responses of children to the Bender-Gestalt Test remain relatively unexplored.

Theory

Bender defines the Gestalt function ". . . as that function of the integrated organism whereby it responds to a given constellation of

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[3]Billingslea, loc. cit.

[4]W. Gobetz, A Quantification, Standardization and Validation of the Bender-Gestalt Test on Normal and Neurotic Adults. Psychology Monograph, 1953, 67, 6, No. 356.

[5]Lonstein, "A Validation of a Bender-Gestalt Scoring System." Journal of Consulting Psychology, 1954, 18, pp. 377-379.

[6]G. R. Pascal and B. J. Suttell, The Bender-Gestalt Test: Quantification and Validity for Adults. (New York; Grune and Stratton, 1951), pp. 42-43.

[7]Ibid.

stimuli as a whole; the response itself being a constellation, or pattern, or gestalt."[8] Furthermore, Bender states:

> Integration occurs by differentiation. The whole setting of the stimulus and the whole integrated state of the organism determines the pattern of the response. Any resulting pattern has its background and orientation in the relation to spatial gestalt function. A series of sensory motor experiences involves temporal patterning. Any deviation in the total organism will be reflected in the final sensory motor pattern in response to the given stimulus pattern.[9]

The reproduction of the Bender designs is determined by something more than the stimulus. It is, as Bender has indicated, the product of the whole test situation, including the whole integrated state of the organism. It follows, then, that any reproduction of the stimulus figure will reflect any deviation in the total organism. Deviations in response have their basis in deviations in the total responding organism. While accepting the assumption that the total responding organism is involved and that the organism functions as an integrated whole, the assumption can also be made that the integrated whole is composed of component parts amenable to analysis and study. Hence, the given stimulus constellation may be used in similar situations to study the gestalt function in various pathologically integrated conditions.

Billingslea notes that the Bender-Gestalt Test was built on the premise that accurate visual-motor perceptual behavior is a skillful act. He states:

> This skillful perceptual act is considered to involve (a) sensory reception, (b) central neural interpretation, and (c) motor reproduction (hand drawing) by the perceiving subject of

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[8]Bender, op. cit., pp. 3-4.

[9]Ibid.

> the stimulus objects. The premise goes further and states that this total perceptual process can be distorted by neural injury, by variations in intellectual level, and by maladjustments in the emotional organization of the perceiving subject.[10]

Pascal and Suttell elaborate the assumptions made by Bender as follows:

> We would, in general, agree with this formulation. The overwhelming mass of clinical evidence gathered with the Rorschach test has served to fashion current opinion regarding the positive effects of experience on responses to perceived stimuli. To substantiate this view a good deal of experimental evidence has been forthcoming. Study of the drawings of psychiatric patients has a considerable history, and the evidence available suggests that when these are compared with those of normal controls discriminating differences can be found. Thus, one would expect that on a task such as copying B-G designs, performance would not only be a function of the individual's capacity to perceive correctly and execute the figures but also of the individual's interpretation of them, i.e., what they and the task mean to him in the light of his own experience.[11]

Pascal and Suttell clearly indicate that three fundamental factors are involved in the copying of the Bender geometric figures: (1) sensory perception, (2) interpretation, and (3) motor reproduction. These authors also observe that deviant performance in the reproduction of the Bender designs should be a function of the "interpretative factors" which obtrude between perception and motor reproduction, if the ability to perceive and to execute the designs is accepted as given.

Pascal and Suttell conceive of the Bender-Gestalt-Motor test as a work sample which involves not only the capacity to perceive and to execute the designs, but also a factor which they designate as an "attitude." In this connection, they state:

> The test situation for the individual, once he is subjected to it, becomes a bit of reality with which he has to cope. We

---

[10]Billingslea, op. cit., p. 1.

[11]Pascal and Suttell, op. cit., p. 6.

> would expect, therefore, that in those persons in whom the attitude toward reality is most disturbed, we will find greater deviations from the stimuli. Our findings corroborate this expectation. In the populations tested by us, of normal intelligence and free of brain damage, the greatest number of deviations were found in the psychotic subjects, fewer in psychoneurotic subjects, and least in nonpatients.[12]

They conclude that some factor other than the ability to perceive and to reproduce the designs is being measured in the scoring of the Bender-Gestalt-Motor Test when used with individuals possessing normal intelligence.[13]

From the quotation above, one can infer that the term perception has a rather broad meaning for Pascal and Suttell. In limiting the interpretative function in referring to the Bender designs, everything else is assigned to the perceptual function. Hence, in addition to sensation, in perception they include seeing Figure A as a circle and a square, Figure Number 1 as twelve dots in a line, etc.

Kleinman has shown by his comparative study of normal and schizophrenic adults that they differ in the interpretation-response phase of the Bender-Gestalt but not in the perceptual phase.[14] The Bender designs then involved no difficulty for adults at the sensory level, but their deviant performance on the Bender figures is a function of the interpretative factors which obtrude between perception and execution.

In a comparative study of normal and disturbed first grade boys,

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[12] Ibid., p. 8.

[13] Ibid.

[14] Bernard Kleinman, "A Study of Factors Involved in the Reproduction of Bender Designs in Normal and Schizophrenic Subjects," (unpublished Ph.D. dissertation, Dept. of Psychology, University of Oklahoma, 1955), p. 52.

Simpson found significant differences between the two groups in their reproductions of the Bender-Gestalt designs. He also ascribes deviant performance to differences in "interpretative factors."[15]

In her early work with children, Bender approached the problem of perception and action by demonstrating the primitive forms of experience and the maturation process in the course of development. Furthermore, she showed the continuous interplay between sensory and motor factors.[16]

Woltmann notes that Bender's studies of children's drawings indicate that the gestalt principles discovered by Wertheimer do not apply to the early graphic maturation phases of development.[17] Direction is much more important to the small child than size, proximity, continuity and distance. According to Woltman, rapid differentiation of form, maturing of the motor apparatus, and the capacity for object representation take place between the fourth and seventh years, or about the time the child enters school.[18] In school, the child is taught formalized social concepts, learns to inhibit his motor impulses, is instructed to copy forms with definite meanings, such as, the letters of the alphabet; and at the same time he is introduced to reading, which is the complicated

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[15]William H. Simpson, "A Study of Some Factors in the Bender-Gestalt Reproductions of Normal and Disturbed Children." (Unpublished Ph.D. dissertation, Dept. of Psychology, University of Oklahoma, 1958), p. 68.

[16]Bender, op. cit., Research Monograph No. 3.

[17]A. G. Woltmann, "The Bender Visual-Motor Gestalt Test.: In L. E. Abt and L. Bellak (eds.) Projective Psychology; Clinical Approaches to the Total Personality. (New York: Knopf, 1950), pp. 322-356.

[18]Ibid.

function of not only learning to recognize each letter but also presents the problem of combining form with phonetics. It is at this stage, according to Woltmann, that Wertheimer's Gestalt principles acquire validity.

Bender states:

> There is an innate tendency to experience gestalten (Schilder) not only as wholes which are greater than their parts (Wertheimer, Koffka, Kohler) but in the state of becoming (Eddington) which integrates the configuration not only in space but in time. Furthermore, in the act of perceiving the gestalt the individual contributes to the configuration. The final gestalt is, therefore, composed of the original pattern in space (visual pattern), the temporal factor of becoming and the personal-sensory-motor factor. The resulting gestalt is also more than the sum of all these factors. There is a tendency not only to perceive gestalten but to complete gestalten and to reorganize them in accordance with principles biologically determined by the sensory motor pattern of action. This pattern of action may be expected to vary in different maturation or growth levels and in pathological states organically of functionally determined.[19]

In regard to the influence of maturation and the ability to reproduce the designs accurately, Pascal and Suttell state:

> The ages over seven add very little more than an improvement of obliquity, and an increase in the number of combinations. Thus, by taking the age of nine as our contrasting age we feel fairly safe in suggesting that the incidence of deviations common to six and seven year olds and not common for ages of nine or above is indicative of at least failure in normal maturation. . .we would postualte now, that it is possible there are two kinds of deviations - one kind resulting from psychogenic illness and one kind from failure of maturation or organic cause.[20]

In this same connection, Bender says:

> Children of three years and younger usually produced only a scribble. . . . All the figures are satisfactorily produced at the age of eleven years. Adults add only a certain motor perfection or perfection in detail in sizes and distances. The test may, therefore, be considered of value as a maturation test

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[19]Bender, op. cit., p. 5.

[20]Pascal and Suttell, op. cit., p. 55.

> of performance in the visual motor gestalt function between the ages of four and eleven.[21]

On the basis of her findings Bender attempted to standardize her material as a performance test for children. She found no valid criteria in young children below the age of four. Up to that age the small child usually produces scribbles. Although the Goodenough-Draw-A-Man Test starts with a basic mental age of three years, really good attempts to draw a man seldom occur below the four year level.[22] Bender's standardization of gestalt maturation and function covers ages four to eleven. Bender, therefore, points out that the test is not valid for normal individuals whose mental age is above the eleven year level.[23] This is in agreement with the Goodenough drawing scale which also ceases to assume validity above this age level.

A frequently used clinical approach to personality study which employs free-hand drawings is the House-Tree-Person technique proposed by Buck.[24] The form and content of the drawings frequently depict significant aspects of a person's personality functioning and consequently may indicate his overall level of development. In this connection, Lowenfeld states:

> Since the experience of the self as a part of environment is one of the most important assumptions for cooperation and visual coordination, the child's inability to correlate things

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[21]Bender, op. cit., p. 113.

[22]F. L. Goodenough, Measurement of Intelligence by Drawings. (Yonkers: World Book Co., 1926), pp. 22-54.

[23]Bender, op. cit., p. 135.

[24]J. N. Buck, "The H-T-P Test." Journal of Clinical Psychology, 1948, 4, pp. 151-159.

> properly in space is a clear indication that he is neither ready to cooperate socially, nor has he the desire to coordinate letters or learn to read. The teacher in the kindergarten will therefore use the child's drawing expression as an indication of the child's ability to participate in tasks which require cooperation.[25]

Research concerning child development has shown that readiness, or sufficient maturation, to engage in particular activities appears at rather definite periods.[26] Of course, the age limits for beginning these activities may vary somewhat for individual cases. Ragan states, "A child cannot be expected to make much progress in reading until he is ready for it. . . .a child may be ready for reading anywhere between the chronological ages of four and eight or even later.[27]

Since reading involves receiving and interpreting visual stimuli the question arises, can some of those factors which have bearing upon readiness to read be detected through the use of the Bender-Gestalt Test? Basic to the search for the answer to this question is the problem of determining the functional significance of the motor maturity factor in children below the age of eleven years.

Problem

It is the purpose of the present investigation, using samples of "reader" and "non-reader" first grade boys of average intelligence, to examine the validity of assigning deviant performance in Bender-Gestalt reproduction to "interpretative factors." The study will also contribute

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[25]Viktor Lowenfeld, Creative and Mental Growth (MacMillan Co. N. Y.), p. 114.

[26]R. J. Havighurst, Developmental Tasks and Education, (Logmans, 1950), pp. 1-32.

[27]William B. Ragan, Modern Elementary Curriculum, Revised edition. (Henry Hold and Co., Inc. 1960), pp. 197-198.

information regarding the maturation process with particular relevance to reading readiness. If in the execution of the designs, the non-reader subjects are sharply differentiated from the reader subjects, and if it can be demonstrated that the two groups are comparable in performance in the perceptual and motor phases, then the assumption of assigning deviant performance in Bender-Gestalt reproduction to "interpretative factors" would hold.

The general hypothesis herein under study is that differences in Bender-Gastalt reproduction exhibited by readers and non-readers are assignable to "Interpretative factors." In order that the three factors involved in the reproduction of the Bender designs i.e., (1) perception, (2) interpretation, and (3) motor reproduction, may be separated out for closer scrutiny three separate hypotheses are necessary.

Hypothesis One. Reader and non-reader children differ significantly in copying twelve selected geometric figures.

a. They differ significantly in copying a cross.

b. They differ significantly in copying a star.

c. They differ significantly in copying a circle.

d. They differ significantly in copying a square.

e. They differ significantly in copying a vertical diamond.

f. They differ significantly in copying a horizontal diamond.

g. They differ significantly in copying an open square.

h. They differ significantly in copying a curve.

i. They differ significantly in copying a horizontal sinusoidal.

j. They differ significantly in copying a rotated sinusoidal curve.

k. They differ significantly in copying a horizontal hexagon.

1. They differ significantly in copying a rotated hexagon.

Hypothesis Two. Reader and non-reader children differ significantly in discrimination in the perceptual phase of the Bender-Gestalt.

Hypothesis Three. Reader and non-reader children differ significantly in their reproductions of the Bender-Gestalt designs.

CHAPTER II

EXPERIMENTAL PROCEDURES

The procedures in this study can be broken down into three basic phases; motor, perceptual, and interpretative. The terms, motor phase, perceptual phase, and interpretative phase, are classificatory in nature and are intended to reflect the three aspects of the total act of reproducing the Bender-Gestalt designs as listed by Pascal and Suttell.[1]

The Bender-Gestalt-Motor Test consists of nine geometric figures printed on four-inch by six-inch white cards.[2] Originally, these figures were part of Wertheimer's classical "Studies in the Theory of Gestalt Psychology."[3] In the present investigation the nine figures were presented to each subject together with twelve additional designs. A circle, a square, a vertical diamond and horizontal diamond were reproduced in size from the Stanford Binet Intelligence Scale - Form L.[4] A cross and

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[1]G. R. Pascal and B. J. Suttell, The Bender-Gestalt Test: Quantification and Validity for Adults. (New York; Grune and Stratton, 1951).

[2]Lauretta Bender, "A Visual-Motor Gestalt Test and its Clinical Use." Research Monograph No. 3, American Orthopsychiatric Association, 1938, p. 4.

[3]Max Wertheimer, "Studies in the Theory of Gestalt Psychology," Psychologischi Forschung, 1923, 4, pp. 301-350.

[4]L. Terman, and Maude Merrill, Measuring Intelligence. (New York: Houghton Mifflin Co., 1937), pp. 82-98.

star were reproduced in size from the Merrill-Palmer Scale of Mental Tests.[5] The remaining six designs were taken from the Bender designs. The Bender designs were broken down into their basic component parts and reproduced in size. The procedure of separating the Bender designs enables an added check to be made regarding the comparison of the ability of both groups studied to reproduce simple designs, similar in part to the Bender designs. The Bender-Gestalt-Motor Test designs are shown in Figure 1 and the Simple geometric forms in Figure 2. The figures taken from the Bender designs are as follows: The open square (design 4), the curve (design 4), the horizontal and rotated sinusoidal curves (design 6), the horizontal hexagon (design 8), and the rotated hexagon (design 7).

The subject was asked to reproduce (copy) each of the total of twenty one figures on four-inch by six-inch white cards. The administration, except for the use of individual cards for reproduction followed the standard Bender-Gestalt administration procedure. The directions are simply: "I have some cards here with very simple designs on them. I want you to copy these designs. Draw what you see. Draw your design on this white card." Additional instructions given the subject stated that the drawing of the designs was to familiarize him with some designs he would be looking at later. The subject was then given a single white card and a freshly sharpened pencil and instructed to go ahead and make his drawing. When the subject completed copying the design, the stimulus design card and the reproduction were turned face down and the subject was given another white card and another freshly sharpened pencil. This procedure was followed for all twenty one designs.

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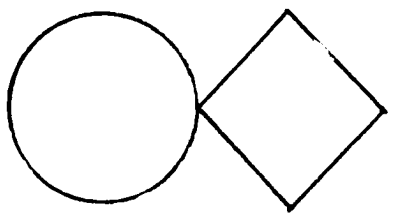
[5]Rachel Stutsman, Mental Measurement of Preschool Children (Yonkers-on-Hudson, N.Y.: World Book Co. 1931), pp. 182-184.



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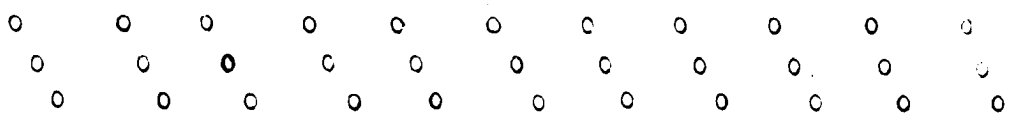

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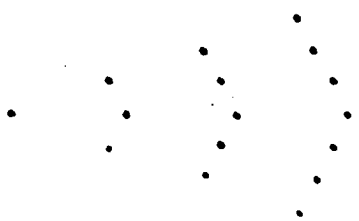

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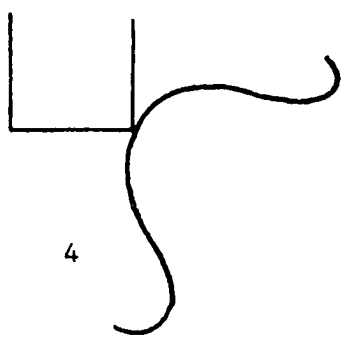

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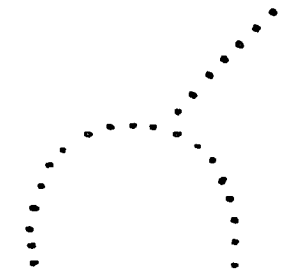
Figure 1. - Bender-Gestalt-Motor Test Figures



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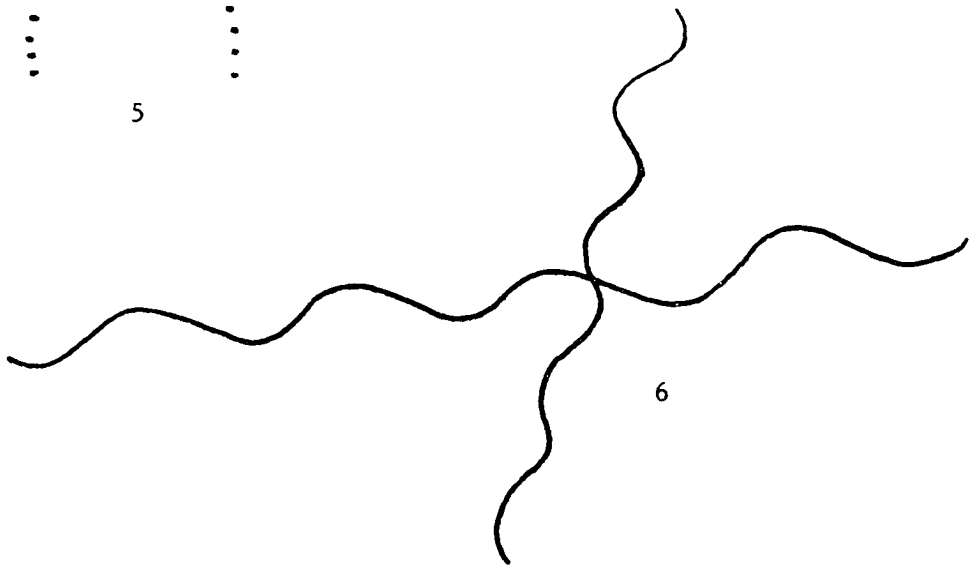

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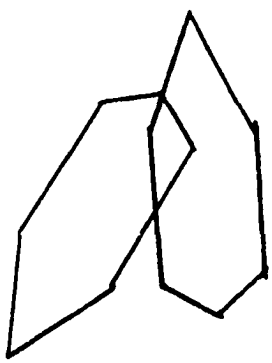

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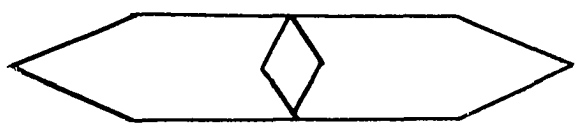

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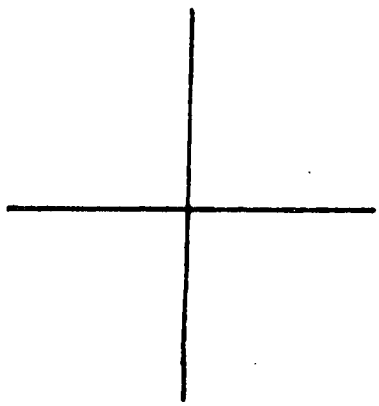
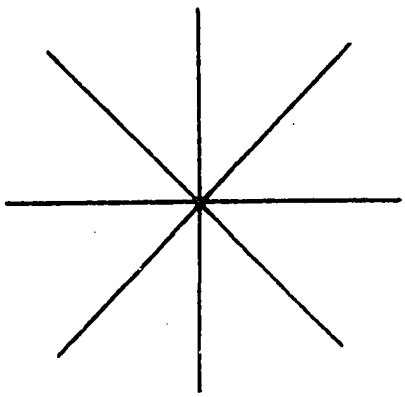
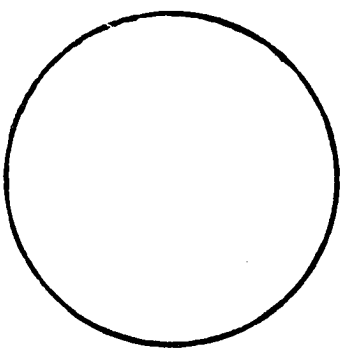
Figure 1, - Bender-Gestalt-Motor Test Figures (Cont'd)



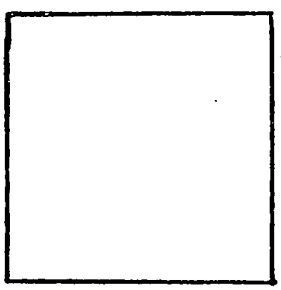
Cross



Star

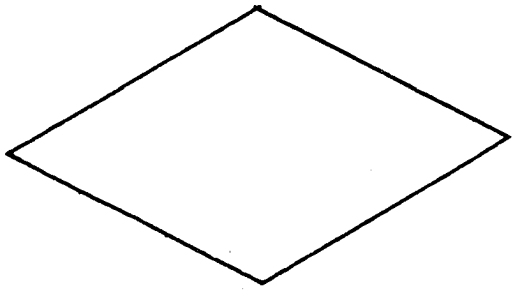


Circle

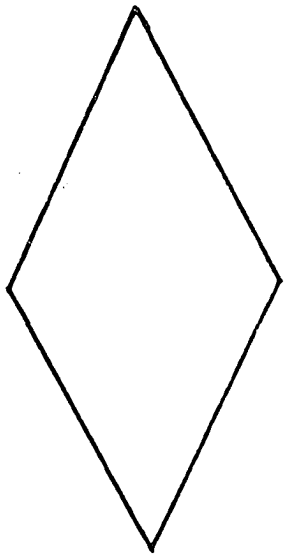


Square

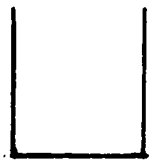
Figure 2.--Simple Geometric Figures



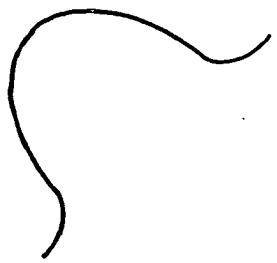
Horizontal Diamond



Vertical Diamond



Open Square

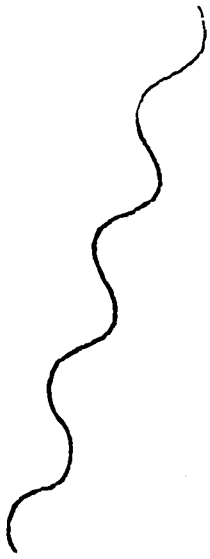


Curve

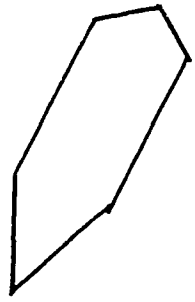
Figure 2.--Simple Geometric Figures (Cont'd)



Horizontal Sinusoidal Curve



Rotated Sinusoidal Curve



Rotated Hexagon



Horizontal Hexagon

Figure 2.--Simple Geometric Figures. (Cont'd)

Motor Phase

The use of the cross, star, circle, square, vertical diamond, and horizontal diamond, was based on their widely accepted validity as measure of motor development. In view of their acceptance as valid measures of motor development, they were used for comparison purposes in the motor phase of the Bender-Gestalt for the subject groupings.

Relative to the above Gesell and his associates have shown that copying simple geometric figures is related to differences in development among children.[6,7] Lowder in his study of perceptual ability and school achievement has shown that the cross, square, vertical diamond, and horizontal diamond represent a continuum of copying difficulty.[8] Like Gesell, Lowder suggests that the figures also represent levels of motor performance maturity.[9] Gesell, et. al., were able to demonstrate from the results of their studies of motor development of children, that children, when required to copy simple geometrical forms, tend to prefer somewhat different motor movement patterns at different age levels.[10] This motoric movement pattern was termed "directionality."[11] For example, in drawing a cross four-year-old children will draw the vertical

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[6]Arnold Gesell, et. al., The First Five Years of Life. (Harper & Bros., 1940), pp. 137-169.

[7]Arnold Gesell and L. B. Ames, "The Development of Directionality in Drawing," (Journal of Genetic Psychology), 1946, 68, pp. 45-61.

[8]R. G. Lowder, "Perceptual Ability and School Achievement." (Unpublished Ph.D. dissertation, Purdue University, 1956), pp. 38-42.

[9]Gesell, et. al., loc. cit.

[10]Gesell and Ames, loc. cit.

[11]Gesell, et. al., loc. cit.

line "up" more often than will five-year olds.[12] The latter prefer to draw the vertical line "down". The ability of children to perform the motor task of copying simple geometrical figures has been demonstrated to be related to the maturity level of children age-wise; thus successful performance on the simple figures noted above is related to developmental differences as expressed in age terms. These developmental differences may be highlighted by comparative descriptions of motor behavior of children ages four, five, and six on the cross, square, and diamond. Gesell et al. comment as follows:

> The Cross. At 4 years he copies, but errs on one trial. The lines may be broken or at an angle. At 5 years he copies, but the length is greater than the breadth, or the breadth greater than the length. The lines are rarely broken or at an angle. At 6 years he draws a good copy, correctly proportioned.
>
> The Square. At 4 years the child draws a circle or draws one side straight and completes with a circle like a capital D. Usually one corner is inadequately drawn. Children who do succeed draw four lines, meeting at the corners. At 5 years the child draws three corners adequately. Corners may not be sharp but defined and rounded. The 6 year old draws a square with sharp corners.
>
> The Diamond. At 5 years the child draws an elongated shape, cannot make the points but indicates them by crosslines, indentations, or by circular bulges. At 6 years he copies the form.[13]

From these descriptions it may be discerned, then, for example, that the diamond is beyond the motor maturity level of the four-year-old and the five-year-old is able to reproduce an inaccurate copy.

Terman and Merrill have this to say regarding the copying the diamond which appears at Year VII, no. 3 in the Stanford Binet Scale:

> A most puzzling topic for speculation is presented by the fact that a child who can draw a square quite acceptably may be totally

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[12] Ibid., p. 100.

[13] Ibid., p. 104.

> unable to draw a diamond. Success with either seems to hinge upon ability to break up the unitary character of the perceptual experience when the child attempts to reproduce the figure. Difficulties in execution are involved in the reproduction of the parts, which have been perceived not as parts but as features of a whole. The characteristic failures with the diamond in the case of children below seven years of age give us valuable cues concerning the process involved. . . ."Lack of mastery over the oblique strokes," which Gesell found to be characteristic of the earlier stages in the development of motor control, is also involved in the failure to execute the perceptual pattern.[14]

Pascal and Suttell state that motor ability is one of the given factors involved in the copying of the Bender-Gestalt designs, when assigning differences in reproduction to "interpretative factors."[15] Copying implies the duplication of an original in as close a resemblance to it as is possible. In view of the overwhelming evidence concerning variation in motor development among children the assumption of no difference in motor performance maturity between the two groups of subjects used in this study does not appear justified.[16]

Utilizing the six simple geometric figures, namely cross, star, circle, square, vertical diamond, and horizontal diamond which have been shown to represent levels of copying difficulty and which yet remain at least within the theoretical limits of the average grade school child's ability to reproduce, comparative analysis then may be made between the selected subject groupings of this study, readers and non-readers in the

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[14]Termin and Merrill, op. cit., p. 230.

[15]Pascal and Suttell, op. cit., p. 6.

[16]R. J. Havighurst, Developmental Tasks and Education, (Logmans, 1950), pp. 1-32.

first grade, to check the validity of the Pascal and Suttell assumption.[17,18] Further, the remaining six simple geometric designs which are the basic component parts of the Bender designs will serve as an added check on the Pascal and Suttell assumption with particular relevance to the subjects reproduction of the Bender designs themselves.

In order to assign any obtained difference in the reproduction of the Bender designs by the subject groupings to "interpretative factors," as proposed by Pascal and Suttell, it is essential that the assumption concerning motor performance maturity be investigated.

Perceptual Phase

Following the administration of the Bender designs, together with the twelve simple geometric designs, shown in Figures 1 and 2 on pages 14-18, the subject was then presented a series of Bender stimulus cards and asked to "Choose the one which is the same as the one you were shown to copy; choose the one which is just like the one you were shown to copy." After all of the designs were presented in this manner an added check on perceptual discrimination was made. Each of the series of Bender Cards were presented again with the directions: "Pick out the two that are the most alike, which two look almost the same. In each case the original card and the last distorted card were more similar than the other two cards.

The series of stimulus cards for each Bender design included a replica of the regular Bender card and three replicas of Bender drawings

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[17] Stutsman, loc. cit.

[18] Lowder, loc. cit.

given by six year old children, each with a greater degree of distortion than the regular Bender design. The three replicas also differed from each other in degree of distortion. All designs of all sets of stimulus figures were reproduced on four-inch by six-inch white cards. The reproductions were drawn so that line, width, inking, and other construction characteristics were mechanically equal. (The reader may refer to Appendix A for these figures.)

Each set of four stimulus cards for each Bender design was mounted on white cardboard 1/16 inch thick, 25 inches long, and 10 inches wide. The cards were spaced approximately 1/4 inch apart, and they were covered with clear plastic sheeting to eliminate finger marking and smudging of the figures during the experiment. Thus, there were nine stimulus sets of four figures. The order of arrangement of the stimulus cards of each series of four cards was determined by the "Table of Random Numbers."[19] Table 1 shows the order of arrangement of the stimulus cards as mounted on the cardboard. The position on the reader of this thesis is the same position occupied by the subject when viewing the designs. The numbers represent the degree of distortion of the individual design from the regular Bender Card. Thus, card number four is the one expressing the greatest degree of distortion. Each set of four figures for each Bender design was presented singly to the subject, and he was asked to make his choice of the design originally shown him to copy.

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[19]A. L. Edwards, Experimental Design in Psychological Research. (New York: Rinehart & Co., 1950), pp. 332-336.

Table 1

Bender Replica Card Arrangement

Bender Design	Replica Card Position			
A	4	3	1	2
1	3	1	4	2
2	2	1	3	4
3	4	3	2	1
4	2	4	3	1
5	1	3	2	4
6	3	2	1	4
7	1	2	4	3
8	4	1	3	2

The perceptual phase study required a technique which would be easily understood by the subjects. Accordingly, a procedure similar to the "Pictorial Likenesses and Differences" test (Year VI level) of the Stanford Binet Intelligence Scale--Form L was chosen.[20] The "Pictorial Likenesses and Differences" test requires the child to point to the one picture that is ". . . not the same as the others."[21] Success on this test depends not so much on language comprehension as on the ability to make discriminating reactions at a perceptual level. Terman and Merrill note that, ". . . dependence on language comprehension has been minimized by a procedure that makes use of both same and alike in the instructions . . ."[22] These authors state, in conclusion, "Thus, the problem involves

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[20]Terman and Merrill, op. cit., p. 90.

[21]Ibid.

[22]Ibid., p. 214.

mainly the visual perception of similarities and differences pictorially presented."[23]

The ability to make discriminative responses in the presence of an object is an early aspect of perceptual development which precedes the ability to react adaptively in the absence of the object."[24]

Terman and Merrill note that responses to similarities and differences ". . . on both the perceptual and ideational level develop earlier than the ability to verbalize such distinction."[25] A successful discriminative response depends not only upon the ability to make a discriminative reaction but also upon the ability of the child to keep in mind a directing idea. The maintenance of the directing idea requires continued repetition of instructions with each presentation of the various stimuli.

Pascal and Suttell state that there can be no doubt that the individual is able to see the Bender designs as they are pictorially represented. Although child psychology has given relatively little emphasis to perception, studies appearing from time to time indicate that perceptions of children tend to be vague and inaccurate when compared with adult standards.[26,27] Attention to major details of the stimulus,

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[23] Ibid.

[24] Ibid., 228.

[25] Ibid.

[26] L. B. Ames, J. Learned, R. Metraux and R. Walker, "Development of Perception in the Young Child as Observed in Responses to the Rorschach Test Blots," Journal of Genetic Psychology, 1953, 82, pp. 183-204.

[27] L. Hemmindinger, "Perceptual Organization and Development as Reflected in the Structure of Rorschach Test Responses." Journal of Projective Techniques, 1953, 17, pp. 162-170.

together with increasing accuracy, is noted with increments in age development. In elementary school children perceptual accuracy is important in discriminating various letters and organizing them into meaningful relationships to form words. Perceptual accuracy, therefore, seems related to the ability to read.[28] Thus, on the basis of available evidence, differences in discriminative behavior might be expected between readers and non-readers.

Data available in the area of visual discrimination by children suggests, then, that the task should be one requiring only gross accuracy. The task should not require the child to make discriminations which involve nuances of detail. Accordingly, figures other than the replica of the original Bender Card were selected so as to be visibly different not only from the original Bender Card but from each other as well. Thus, the task for the child involved the visual discrimination of similarities and differences pictorially presented.

This part of the experimental design permitted the testing of the second assumption of Pascal and Suttell that reading and non-reading children do not differ in visual discrimination behavior in the perceptual phase of the Bender-Gestalt.

Interpretative Phase

For some time the Bender Gestalt-Motor Test has been used without adequate objective scoring criteria. Pascal and Suttell presented

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[28] H. P. Davidson, "A Study of the Confusing Letters, B, D, P. and Q," Journal of Genetic Psychology, 1935, 47, pp. 458-468.

their scoring scheme in 1951.[29] Since this time it has received further validation with adults.[30,31,32] Pascal and Suttell and Goldberg have demonstrated that the scoring standards can be applied to the Bender reproductions of children as well.[33,34] Goldberg found that the Pascal and Suttell scoring criteria significantly differentiated the Bender reproductions of normal upper grade school children from those of schizophrenic and retarded children of comparable age.[35]

The Pascal and Suttell scheme has scoring standards for only eight of the nine figures; design "A" is omitted. There is a total of ninety-nine scorable deviations for the eight designs. (The reader is referred to Appendix B for inspection of scorable deviations for the various designs.) Scores are accumulated by designs, plus the scores which have to do with the test as a whole, termed "configuration scores," from which a final raw score is obtained. The total raw score is then translated into a standard (Z) score. In the current study the "configuration score" was not used since the Bender designs were individually reproduced

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[29]Pascal and Suttell, loc. cit.

[30]J. A. Bowland and H. L. Deablear, "A Bender-Gestalt Diagnostic Validity Study," Journal of Clinical Psychology, 1956, 12, pp. 82-84.

[31]R. H. Cornutt, "The Use of the Bender-Gestalt With an Alcoholic and Non-alcoholic Population," Journal of Clinical Psychology, 1953, 19, pp. 287-290.

[32]N. M. Robinson, "Bender-Gestalt Performance of Schizophrenics and Paretics," Journal of Clinical Psychology, 1953, 19, pp. 291-293.

[33]Pascal and Suttell, op. cit., pp. 41-66.

[34]F. H. Goldberg "The Performance of Schizophrenic, Retarded, and Normal Children on the Bender-Gestalt Test." American Journal of Mental Deficiency," 1957, 61, pp. 548-556.

[35]Ibid.

on single white cards. Furthermore, since the standard (Z) score conversion tables are not available in the Pascal and Suttell manual for younger age groups, the raw score was used. Pascal and Suttell have utilized the raw score in their studies of the Bender reproductions of children.[36] In the present study the raw score consists of accumulated scorable deviations for the total of eight designs.

In addition to the use of the Pascal and Suttell manual, in this study, a transparent plastic ruler, a protractor, and a magnifying glass were employed when necessary to check on questionable angular rotation or fine tremor.[37]

Pascal and Suttell make the following statements with regard to the application of their scoring system:

> The scoring system is practical. It is not, however as we have stated, entirely objective or rigidly accurate in measurement. It is most certainly not foolproof. Training, therefore, is essential. It is necessary to understand what is meant by each deviation. It is necessary to study the manual thoroughly and to work through the sample records before attempting to use the scoring system in practice. Investigation has shown that thorough study of the manual leads to reasonable reliability in scoring when score sheets are used.[38]

Several examples of Design 4 selected from the Pascal and Suttell manual will clarify dramatically the scoring procedures.

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[36]Pascal and Suttell, op. cit., p. 42.

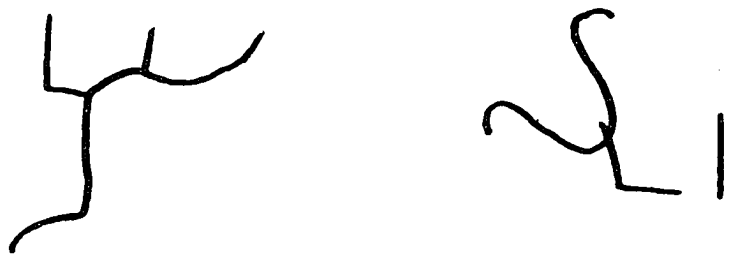
[37]Ibid., pp. 10-14.

[38]Ibid., pp. 12-13.

Curve and square overlapping and not joined. Score 8. Where the peak or the curve is separated by 1/4 inch or more, from the adjacent corner of the square, or where the curve overlaps the adjacent corner by 1/8 inch or more, the item is scored.[39]



Distortion. Score 8. This deviation is rarely encountered; to score the item the reproduction should be a marked distortion of the stimulus.[40]



The present investigation consists of three phases. The first considers the implications of motor maturity exhibited by reader and non-reader children. The second phase considers the implications of the sensory process of perceiving the Bender designs as they are pictorially represented. The third phase is concerned with assigning differences in performance on the Bender designs to "interpretative factors." Accordingly, then, some means must be used which will bring out whatever differences in Bender reproduction that may obtain between the subject groupings. If groups perform similarly in the motor and perceptual

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[39] Ibid., p. 138.

[40] Ibid., p. 143.

phases, then differences in reproduction of the Bender designs that emerge between the reader group and the non-reader group would be assignable to "interpretative factors." The interpretative phase of the study, then, is concerned with determining whether reader and non-reader children differ in their reproductions of the Bender designs. The results of this phase of the investigation will have implications for the validity of the Bender-Gestalt Test, even though test validity is not a primary consideration.

Selection of Subjects

The Population

It seems imperative, at this point, to discuss some of those factors involved in selecting the subjects for this study. The fact that man has been able to develop himself into a social being stems, in part, upon his ability to communicate through language activities. Words are essentially language written down. Zahner has pointed out:

> . . . one of the cardinal principles of language is that words derive their meanings from their intricate connections with the world, the world of things and of men, in other words, from man's total experience in his environment of animate and inanimate creation.

This is the foundation of the meaning of words.[41]

If reading is to be serviceable to man then it appears the meaning the words symbolize must be kept uppermost in the mind of the reader. Betts has stated that "Reading is the reconstruction of the facts behind

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[41]Louis Zahner. "Approach to Reading Through Analysis of Meanings," Ch. IV of Reading and General Education. (Washington, D. C.: American Council on Education, 1940), p. 77.

the symbols."[42] Betts goes on to say:

> Reading requires the establishment of purposes: the association of new experiences with the individuals background; the anticipation of meaning; the use of judgement; the appreciation, organization and retention of ideas; the drawing of inferences; and similar mental and emotional reactions, depending upon the purpose of the reading and the type of material under consideration.[43]

Interpretation of the words in terms of their meaning then becomes an important factor in reading. Conceivably those individuals who have difficulty in learning to read in the absence of organic or serious psychological factors do so due to "interpretative" or "meaning" factors. These interpretative factors are the crux of the present study.

The fifty male first grade subjects involved in this study were placed into two groups primarily according to their reading ability. The first group were those who were considered to be adequate readers. The second group were those who were considered to be non-readers. The children were in the Spring semester of the first grade at Townsend Elementary School in Midwest City, Oklahoma.

In an attempt to rule out some of those variables which would influence the results in the various "phases," none of the subjects has neither been retained in kindergarten nor in the first grade. None of the children represented presented complicating features such as epilepsy, cerebral palsy, brain damage, neurological impairment nor any evidence of emotional disturbance.

The basic criterion used in attempting to determine their reading

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[42] E. A. Betts, Foundations of Reading Instruction. (American Book Company, 1946), p. 11.

[43] Ibid., p. 75.

status was the sight vocabulary appropriate to their basic reading texts. For placement in the reading group, a basic sight vocabulary of between two hundred and fifty and three hundred words and reading at their general level of expectancy was considered adequate. The non-readers were those who were reading below their level of expectancy and who had a sight vocabulary of fifty-five words or less. In each case, the child's reading teacher was asked to make the judgment of reading ability. The principal at the school and the other teachers were asked to judge the children in terms of the remaining selection criteria.

There seems to be general agreement among the publishers of children reading texts as to the appropriate number of words a child should know to be reading in the texts at the various levels. Several companies list charts which show the number of new words introduced at each level from the pre-primer to the first reader.[44,45,46,47] A comparison of the new word listings at various reading levels by several of the childrens text book publishers can be seen in Table 2.

With the assistance of the Principal, teachers, and other school personnel, the selection of those subjects comprised in the reading group was made according to the following criteria:

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[44]Every Child Can Read, (American Book Co., California. 116-D), p. 8.

[45]The Ginn Basic Readers, (Ginn and Co., Boston, No. 597-3, 56), p. 8.

[46]Vocabulary: McKee Reading Series, (Houghton Mifflin Co. Boston, RFM W/I), p. 9.

[47]Today's Work Play Books, (The MacMillan Co., New York), p. 12.

1. Enrollment in the first grade in school
2. Never referred to any clinic or agency for psychological evaluation because of emotionally disturbed adjustment
3. Within the average range of intelligence; I.Q. 90-110 as determined by the Stanford-Binet Intelligence Scale, Form L.
4. Within the age range of 6 years and 8 months to 7 years and 8 months
5. Has never been retained in kindergarten or first grade
6. Free of brain injury, convulsions, cerebral palsy, and other physical handicaps
7. Spontaneous and outgoing
8. Relates well to peers and adults
9. Effective and productive in the classroom
10. Well liked by other children
11. Has good relationship with own parents
12. Few or no neuropathic mannerisms, tics, compulsions, fears
13. Cooperative and reasonably conforming
14. Relatively consistent and stable in behavior
15. Reading at, near, or above expectancy level with a sight vocabulary in the basic reading text between 250 and 300 words

Table 2

Number of New Words Introduced at Various Reading Levels by Publishers

	Pre-Primer			Primer	First Reader	Total
	1	2	3			
American Book Co.	11	20	23	99	158	321
Ginn & Co.	21	23	14	113	183	354
Houghton Mifflin	20	25	15	91	164	315
MacMillan	30	--	22	129	168	349

In general, this group includes those children who are best described as having the ability to read satisfactorily at the general level of expectancy of their age-grade mates.

With the assistance of the Principal, teachers, and other school personnel, the selection of those subjects comprised in the non-reader group was made according to the following criteria:

1. Enrollment in the first grade in school
2. Never referred to any clinic or agency for psychological evaluation because of emotionally disturbed adjustment
3. Within the average range of intelligence; I.Q. 90-110 as determined by the Stanford-Binet Intelligence Scale, Form L.
4. Within the age range of 6 years and 8 months to 7 years and 8 months
5. Has never been retained in kindergarten or first grade
6. Free of brain injury, convulsions, cerebral palsy, and other physical handicaps
7. Spontaneous and outgoing
8. Relates well to peers and adults
9. Effective and productive in the classroom
10. Well liked by other children
11. Has good relationship with own parents
12. Few or no neuropathic mannerisms, tics, compulsions, fears
13. Cooperative and reasonably conforming
14. Relatively consistent and stable in behavior
15. Reading below expectancy level with a sight vocabulary in the basic reading text of fifty-five words or less

The ages of the subjects in the reading group ranged from six years and eight months to seven years and eight months, while the ages of the subjects in the non-reader group ranged from six years and eight

months to seven years and six months. The intelligence level of the reader group subjects ranged in I.Q. from 91 to 109, while the non-reader group subjects ranged in I.Q. from 91 to 110. The ages and I.Q. scores of the subjects can be seen listed in Table 3. Table 4 provides summary data regarding the nature and similarity of the reader and non-reader groups.

The F test for homogeniety of variance for age and I.Q. was found in both tests to be less than the value significant at the five per cent level. Therefore, the assumption of homogeniety of variance is justified.[48]

The two groups consisted of twenty-five reader and twenty-five non-reader boys of comparable age, school grade placement, and intelligence.

Summary

Twenty-five reader and twenty-five non-reader first grade boys of average intelligence were exposed to identical experimental conditions. They were required to reproduce (copy) six simple geometric figures which varied in level of difficulty; namely, a circle, a cross, a star, a square, a vertical diamond, and an horizontal diamond along with six designs which were component parts of some of the Bender designs. The latter six drawings mentioned were the open square (design 4), the curve (design 4), the horizontal and rotated sinusoidal curves (design 6), the rotated hexagon (design 7), and the horizontal hexagon (design 8.) In addition to these they were required to reproduce all nine of the geometric figures

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[48]J. P. Guilford, Fundamental Statistics in Psychology and Education. (McGraw Hill Book Co., Inc. N.Y. 1956), p. 224.

Table 3

Age and I.Q. Data for Subjects

Subject	C.A. (Mths)	I.Q.	Subject	C.A. (Mths)	I.Q.
A	87	101	AA	82	105
B	81	93	AB	86	101
C	85	100	AC	83	93
D	89	108	AD	83	95
E	86	100	AE	88	99
F	83	95	AF	81	108
G	82	92	AG	84	110
H	83	109	AH	80	100
I	88	103	AI	90	97
J	86	96	AJ	87	92
K	86	106	AK	80	102
L	92	105	AL	85	95
M	84	93	AM	81	91
N	86	94	AN	86	96
O	89	108	AO	90	98
P	86	105	AP	85	104
Q	81	101	AQ	86	108
R	88	97	AR	86	91
S	85	100	AS	88	97
T	83	94	AT	80	108
U	84	109	AU	89	101
V	80	95	AV	82	95
W	88	105	AW	85	101
X	87	91	AX	84	93
Y	83	102	AY	81	104
Mean	85.28	100.08		84.48	99.36
S.D.	2.91	5.79		3.14	5.72

Table 4

Composition of the Reader and Non-Reader Groups

Item	Group	
	Reader	Non-Reader
Sex	Male	Male
Number	25	25
Chronological Age		
Range	6 yrs. 8 mos. to 7 yrs. 8 mos.	6 yrs. 8 mos. to 7 yrs. 6 mos.
Mean	85.28 mos.	84.48 mos.
S.D.	2.91	3.14
Intelligence		
Range	91-109	91-110
Mean	100.08	99.36
S.D.	5.79	5.72

of the Bender-Gestalt-Motor Test.[49] The figures were individually reproduced on single four-inch by six-inch white cards. Following the administration of the simple figures and the Bender-Gestalt designs, the subjects were presented with nine sets of stimulus figures, each consisting of four designs mounted on white cardboard. The four designs included a replica of the regular Bender design and three replicas of Bender drawings reproduced by six-year old children. Two of the replicas reproduced by the six-year olds varied in distortion from each other and each was more distorted than the third which was only a slight distortion from the original design. On presentation of each set of stimulus figures, the subjects were asked to "Choose the one which is the same as the one you were shown to copy; choose the one which is just like the one you were

[49]Lauretta Bender, "A Visual-Motor Gestalt Test and its Clinical Use." Research Monograph No. 3, American Orthopsychiatric Association, 1938, p. 4.

shown to copy." Each of the sets of stimulus figures were presented again with the directions "Pick out the two that are the most alike; which two look almost the same." The selections were then recorded on data sheets.

Analysis of the Data

In order to ascertain whether group differences occurred as hypothesized, it was necessary to translate the date into several different scores or measures, depending upon the specific hypothesis to be tested. The five per cent level of confidence was set as the value required for acceptance of the various hypotheses.

Since the first hypothesis is concerned with subject performance on the twelve simple geometric figures, the first step in the breakdown of the data involved the translation of performance on these figures into passing and failing scores according to the following criteria.

1. Cross: Straight lines approximately the same length; crossed near the center; lines at approximately 90 degree angles.

2. Star: Straight lines approximately the same length; lines radiating from a center point.

3. Circle: Rotary motion in reproducing the circle; approximately round; need not be closed.

4. Square: Four well defined angles; no "ears" at corners; lines relatively straight; well proportioned; not rectangular.

5. Vertical Diamond: Four well defined angles; no "ears" at corners; correct shape; not square or "kite-shaped;" drawn on vertical plane.

6. Horizontal Diamond: Four well defined angles; no "ears" at corners; correct shape; not square or "kite-shaped;" drawn on horizontal plane.

7. Open Square: Straight baseline; straight vertical line at each end of baseline; correct shape.

8. Curve: Bell shaped with turned up ends; reasonable symmetry.

9. Sinusoidal Curve: Wavey line on horizontal plane.

10. Rotated Sinusoidal Curve: Wavey line on oblique plane.

11. Horizontal Hexagon: Six angles; six sides; approximately correct gestalt on horizontal plane.

12. Rotated Hexagon: Six angles; six sides; approximately correct gestalt on oblique plane.

Prior to the scoring of the simple figures the reader and non-reader subjects were randomly assigned letter designations to obscure their identity. Their reproductions on the simple figures were, in turn, coded with the letter designations. The designs were then arranged in alphabetical order and scored according to the criteria listed above. The results of scoring the simple figures are shown in Tables 5, 6, 7, 8.

Since each subjects scores on the simple designs were scored either as passing or failing, the percentage passing any design could be readily determined. The difference between percentages was determined and tested for significance by converting each difference to Student's t and comparing the obtained t with the table value corresponding to the .05 level of confidence. Since the cross, star, circle, square, vertical and horizontal diamonds represent levels of copying difficulty and are likewise measures of motor maturity, significant differences in performance on these figures by readers and non-readers would place in an untenable position the postulate by Pascal and Suttell that deviations in performance on the Bender-Gestalt Test are not attributable to motor factors ". . . in individuals of normal intelligence without demonstrable brain damage . . ."[50] The differences in per cents of the remaining six

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[50]Pascal and Suttell, op. cit., p. 9.

Table 5

Scores on the Simple Geometric Figures
by the Reader Subjects

Subject	Cr	St	C	Sq	Vd	Hd*
A	+	+	+	+	-	-
B	+	+	+	+	-	-
C	+	+	+	-	+	+
D	+	+	+	+	-	+
E	+	+	+	+	-	-
F	+	+	+	+	-	+
G	+	+	+	+	-	+
H	+	+	+	+	+	+
I	+	+	+	+	-	-
J	+	+	+	+	-	-
K	+	+	+	+	+	+
L	+	+	+	+	+	+
M	+	+	+	+	-	-
N	+	+	+	+	+	+
O	+	+	+	+	+	-
P	+	+	+	+	+	+
Q	+	+	+	+	-	-
R	+	+	+	+	+	+
S	+	+	+	+	+	+
T	+	+	+	+	-	+
U	+	+	+	+	+	-
V	+	+	+	+	+	+
W	+	+	+	+	-	+
X	+	+	+	+	+	-
Y	+	+	+	-	-	-

*Abbreviations

Cr. - Cross

St. - Star

C. - Circle

Sq. - Square

Vd. - Vertical Diamond

Hd. - Horizontal Diamond

Table 6

Scores on the Separated Bender-Gestalt Figures by the Reader Subjects

Subject	Os	Cv	Sc	Rsc	Hh	Rh*
A	+	-	-	+	-	-
B	+	+	+	+	-	-
C	+	-	-	+	-	-
D	+	+	+	+	+	+
E	+	-	-	-	-	-
F	+	+	+	+	-	+
G	+	+	+	+	-	-
H	+	+	+	+	+	+
I	+	+	+	+	+	+
J	+	+	+	+	-	-
K	+	-	-	+	-	-
L	+	+	+	+	-	+
M	-	+	+	+	-	+
N	-	+	-	+	+	+
O	-	+	+	+	-	-
P	-	+	-	+	+	-
Q	-	-	-	-	-	-
R	-	+	+	+	-	+
S	-	+	+	-	-	+
T	-	+	+	+	-	+
U	-	-	+	+	-	-
V	-	+	-	-	+	+
W	-	+	+	+	-	-
X	-	+	+	+	+	-
Y	-	+	+	+	-	+

*Abbreviations

Os - Open Square

Cv - Curve

Sc - Sinusoidal Curve

Rsc- Rotated Sinusoidal Curve

Hh - Horizontal Hexagon

Rh - Rotated Hexagon

Table 7

Scores on the Simple Geometric Figures
by the Non-Reader Subjects

Subject	Cr	St	C	Sq	Vd	Hd*
AA	+	+	+	+	+	-
AB	+	+	+	+	-	+
AC	+	+	+	+	+	+
AD	+	+	+	+	+	-
AE	+	+	+	-	-	-
AF	+	+	+	+	+	-
AG	+	+	+	-	+	+
AH	+	+	+	+	-	-
AI	+	-	+	+	-	-
AJ	+	+	+	+	-	-
AK	+	+	+	+	+	+
AL	+	+	+	+	+	+
AM	+	+	+	+	+	-
AN	+	+	+	+	+	-
AO	+	-	+	+	-	-
AP	+	+	+	+	-	-
AQ	+	+	+	-	-	-
AR	+	-	+	-	-	-
AS	+	-	+	-	+	-
AT	+	+	+	+	-	-
AU	+	+	+	+	+	-
AV	+	+	+	+	-	-
AW	+	+	+	-	-	+
AX	+	+	+	+	+	-
AY	+	+	+	+	+	+

*Abbreviations

Cr - Cross

St - Star

C - Circle

Sq - Square

Vd - Vertical Diamond

Hd - Horizontal Diamond

Table 8

Scores on the Separated Bender-Gestalt Figures
by the Non-Reader Subjects

Subject	Os	Cv	Sc	Rsc	Hh	Rh*
AA	+	+	+	-	-	-
AB	+	+	-	+	-	-
AC	+	-	+	+	-	-
AD	+	+	+	+	-	-
AE	+	-	-	-	-	-
AF	+	+	+	+	-	+
AG	+	+	+	+	+	+
AH	+	+	+	+	+	-
AI	+	-	+	-	-	-
AJ	+	+	+	+	-	-
AK	+	+	+	+	-	+
AL	+	+	+	+	+	+
AM	+	-	+	-	-	+
AN	+	+	-	+	-	-
AO	+	-	+	+	-	-
AP	+	+	+	+	-	-
AQ	+	-	-	-	-	-
AR	+	-	+	+	-	-
AS	+	-	+	-	-	-
AT	+	-	+	-	-	-
AU	+	+	+	-	-	-
AV	+	+	+	+	-	-
AW	-	+	+	-	-	-
AX	+	+	+	+	-	-
AY	+	+	+	+	-	+

*Abbreviations

Os - Open Square

Cv - Curve

Sc - Sinusoidal Curve

Rsc -Rotated Sinusoidal Curve

Hh - Horizontal Hexagon

Rh - Rotated Hexagon

simple figures were calculated and tested for significance by Student's t as an added check on motor performance of both groups on designs similar in part to the Bender designs themselves.

Thus, a total of fifty reproductions was given by the reader and non-reader groups for each of the twelve simple geometric figures, resulting in a combined total of six-hundred reproductions. Each individual reproduction was scored as passed or failed. The total number of passes on each design for each group was totaled and converted into percentages and tested for significance by Student's t.

The discrimination scores for the test of the second hypothesis consisted of the errors which the subjects made in identifying the replica of the original Bender stimulus card they were shown to copy. The replica cards of the Bender Test were arranged according to the table of random numbers. The replica of the original Bender card occupied the ordinal positions of 3 2 2 4 4 1 3 1 2 sequentially within the nine four-card series of stimulus figures (see page 24 for the table of arrangement of the four stimulus cards.) Since the question under consideration involved whether or not the subjects could correctly identify the original Bender stimulus card shown them to copy, when it was included in a series of reproductions obtained from six year old children, the test of the discrimination hypothesis required that the subjects be grouped at a gross behavior level in terms of those who made errors and those who did not. Consequently, the degree of independence between diagnosis (reader and non-reader) and discrimination in the perceptual phase of the Bender-Gestalt was evaluated through determining the difference between percentages and testing for significance by converting each difference to

Student's t and comparing the obtained t with the table value at the .05 confidence level. The second set of discrimination scores for the test of the second hypothesis consisted of the errors which the subjects made in identifying the replica and the slightly distorted replica of the original Bender stimulus card as being similar. The slightly distorted replica cards of the Bender Test were arranged according to the table of random numbers. They occupied the ordinal positions 4 4 1 3 1 3 2 2 4 sequentially within the nine four-card series of stimulus figures (see page 24 for the table of arrangement of the four stimulus cards.) The question under consideration in this part of the perceptual phase involved whether or not the subjects could correctly identify the two designs which were the most alike. The subjects were grouped at a gross behavior level in terms of those who made errors and those who did not. The percentages of non errors were determined and tested for significance by converting each difference to Student's t and comparing the obtained t with the table value corresponding to the .05 level of confidence. A significant difference in discriminative behavior between the reader and non-reader subjects would place in an untenable position the second postulate by Pascal and Suttell that deviant performance on the Bender-Gestalt-Motor Test is not attributable to an inability to perceive the designs.[51]

The third hypothesis is concerned with whether reader and non-reader children differ in their reproductions of the Bender-Gestalt designs. Consistent with the treatment of the twelve simple geometric figures, the identity of the subjects' Bender reproductions were obscured by assigning them letter designations. Arranging the designs in alphabetical

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[51]Pascal and Suttell, op. cit., p. 6.

order, they were scored according to the Pascal and Suttell criteria for scorable deviations.[52] Ordinarily the raw scores derived from the designs are converted to standard (Z) scores for comparative analysis, but since Pascal and Suttell do not present Z score conversion tables for the age group used in the present study, raw scores were utilized in the analysis of deviations in performance between subject groupings. Table 9 shows the array and range of raw scores and the means and the standard deviations made by the two groups. (The reader may wish to refer to pages 27-29 and Appendix B for more detailed information on scoring.) The difference between means was checked for significance through the use of Student's t with the value obtained compared with the table value corresponding to the .05 level of confidence.

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[52]Pascal and Suttell, op. cit., pp. 110-201.

Table 9

Bender-Gestalt Raw Scores for Reader and Non-Reader Subjects

Reader	Non-Reader
37	59
37	68
37	70
38	76
43	86
43	86
45	88
46	89
47	89
51	93
54	96
57	97
57	99
57	100
58	101
62	103
64	103
70	103
75	112
78	113
83	115
84	118
92	118
96	135
97	135
Mean 60.32	98.08
S.D. 18.81	18.54

CHAPTER III

RESULTS

The results will be presented for convenience of discussion under the following three headings: (1) Motor Phase, (2) Perceptual Phase, and (3) Interpretative Phase.

Motor Phase

For the purpose of determining whether differences in motor performance maturity exist between the reader and non-reader groups, their performance on the twelve simple geometric figures, that is, cross, star, circle, square, vertical diamond, horizontal diamond, open square, curve, sinusoidal curve, rotated sinusoidal curve, horizontal hexagon, and retated hexagon, was analyzed by finding the differences in per cents of non-error scoring between the two subject groups and applying Student's *t* test for significance. The results of this analysis are presented in tables 10 and 11. If groups differing in reading ability differ significantly in copying ability, i.e., motor performance maturity, then this difference should be revealed when they are called upon to reproduce geometric figures which differ in degree of difficulty. An inspection of tables 10 and 11 reveal no such differences were found. The small differences which occurred can best be explained as resulting from chance fluctuations in sampling. Lowder found the horizontal diamond to be the

Table 10

Performance on the Simple Geometric Figures
by the Reader and Non-reader Subjects:

$S.E._{D\%}$ and t.

	Cr		St		C		Sq		Vd		Hd	
	+	-	+	-	+	-	+	-	+	-	+	-
R*	25	0	25	0	25	0	23	2	12	13	14	11
Nr	25	0	21	4	25	0	19	6	13	12	7	18
$S.E._{D\%}$	.000		24.2		.000		10.34		14.1		14.1	
t**	.000		.66		.000		1.60		.078		1.9	

*Abbreviations

R - - - Reader
Nr- - - Non-reader
Cr- - - Cross
St- - - Star
C - - - Circle
Sq- - - Square
Vd- - - Vertical Diamond
Hd- - - Horizontal Diamond

**t Value must exceed 2.01 to be significant at the five per cent level of confidence.

Table 11

Performance on the Simple Geometric Figures
by the Reader and Non-reader Subjects:

$S.E._{D\%}$ and t.

	Os		Cv		Sc		Rsc		Hh		Rh	
	+	-	+	-	+	-	+	-	+	-	+	-
R*	25	0	19	6	17	8	21	4	7	18	12	13
Nr	24	1	16	9	21	4	16	9	3	22	6	19
$S.E._{D\%}$	12.5		12.9		11.30		12.60		11.30		13.6	
t**	.30		1.2		1.4		1.5		1.4		1.7	

*Abbreviations

R - - - Reader
Nr- - - Non-reader
Os- - - Open Square
Cv- - - Curve
Sc- - - Sinusoidal curve
Rsc - - Rotated Sinusoidal curve
Hh- - - Horizontal hexagon
Rh- - - Rotated hexagon

**t Value must exceed 2.01 to be significant at the five per cent level of confidence.

most difficult figure for first grade children to reproduce.[1] Simpson suggests, in his doctoral research, that the horizontal diamond falls at the upper limits of first grade children's ability to reproduce it satisfactorily.[2] The present study tends to support this contention with particular relevance to the non-reader group. It is interesting to note the response of the groups to the horizontal hexagon and the rotated hexagon. The large number of subjects of both groups who failed these designs would suggest they too fall at the upper limits of the ability of first grade children to reproduce them satisfactorily.

The obtained results are consistent with the hypothesis that no difference exists between the reader and non-reader subjects in copying the cross, star, circle, square, vertical diamond, horizontal diamond, open square, curve, sinusoidal curve, rotated sinusoidal curve, horizontal hexagon, and rotated hexagon. One may conclude, therefore, that the only difference which occurs in the area of motor performance maturity between the groups is due to chance.

Perceptual Phase

To test Hypothesis Two concerning discrimination in the perceptual phase of the Bender-Gestalt two discrimination tests were used: (1) discrimination of the Bender-Gestalt replica designs and (2) discrimination of the replica and slightly distorted replica Bender designs.

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[1]R. G. Lowder, "Perceptual Ability and School Achievement." (Unpublished Ph.D. dissertation, Purdue University, 1956), pp. 38-42.

[2]William H. Simpson, "A Study of Some Factors in the Bender-Gestalt Reproductions of Normal and Disturbed Children." (Unpublished Ph.D. dissertation, Dept. of Psychology, University of Oklahoma, 1958), p. 68.

In determining whether differences in discrimination in the perceptual phase exist it was necessary to find the differences in per cents of non-error scoring between the subject groups for each discrimination test and to apply Student's t test for significance. The results of this analysis are presented in tables 12 and 13.

Table 12

Discrimination of the Bender-Gestalt Replica Designs by the Reader and Non-reader Subjects:

Group	Error	Non-Error
Reader	11	14
Non-reader	17	8

$S.E._{D\%}$ - 14.03

t - 1.7*

*t value must exceed 2.01 to be significant at the five per cent level of confidence

Table 13

Discrimination of the Distorted Bender-Gestalt Replica Designs by the Reader and Non-reader Subjects

Group	Error	Non-Error
Reader	16	9
Non-reader	20	5

$S.E._{D\%}$ - 12.7

t - 1.2*

*t value must exceed 2.01 to be significant at the five per cent level of confidence

If groups differing in reading ability differ significantly in discriminative ability, i.e., the ability to perceive the Bender-Gestalt designs as they are pictorially represented (see Figure 1,) then this difference should be revealed when the reader and non-reader subjects are required to identify the replicas of the Bender stimulus cards they were shown to copy. Further, this difference should be revealed when the reader and non-reader subjects are required to select from four basically similar Bender replicas a replica of the original design they copied and a slightly distorted replica. The results of the two discrimination tests can be seen in Tables 12 and 13. An inspection of these tables reveals that the reader and non-reader subjects neither differ significantly in discrimination of the replica Bender designs nor in the discrimination of the replica and slightly distorted replica designs. The t value obtained failed to meet the confidence test level required for the acceptance of Hypothesis Two. This finding agrees with the Pascal and Suttell postulate concerning the ability of the subject to perceive the Bender designs as they are pictorially represented. This finding in relation to the lack of support by this study of the motor ability postulate further strengthens the position of Pascal and Suttell concerning those factors which are not involved in the total act of reproducing the Bender-Gestalt designs.

The obtained results, then, are consistent with the hypothesis that no difference exists between the reader and non-reader subjects in discriminative ability in the perceptual phase of the Bender-Gestalt.

Interpretative Phase

The interpretative phase is concerned with determining whether differences in Bender reproduction occur between reader and non-reader children. Any difference which obtains between the reader and non-reader groups would be, by the postulates advanced by Pascal and Suttell, assignable to "interpretative factors" which obtrude between ability to see and to reproduce the designs.

Hypothesis Three states that, "Reader and non-reader children differ significantly in their reproductions of the Bender-Gestalt designs." In an attempt to determine if the hypothesized difference obtained between reader and non-reader subjects was significant the student's *t* test for difference between means was applied to the means of the raw score data derived from the scoring of the Bender-Gestalt reproductions by the Pascal and Suttell criteria for deviations (see Table 14.)

Table 15 presents the various design means: The differences between means of the groups for individual designs were determined by applying the *t* test to the data. Table 15 reveals the results of the eight *t* comparisons. For these comparisons a minimum *t* value of 2.01 was determined necessary to significantly differentiate between the groups at the five per cent level. Inspection of Table 15 reveals the magnitude of scorable deviations in performance by the groups on the various designs and the *t* values. The scorable deviations favor the non-reader group. Of the eight designs, designs one and three failed to differentiate the two groups. Further inspection of Table 15 indicates that both groups exhibited the greatest number of deviations on design seven and the fewest on design five. The non-reader group reproduced design two with significantly more scorable deviations than the reader group.

Table 14

Bender-Gestalt Raw Score Means, Standard Deviations and t Value* for the Reader and Non-reader Subjects

	Reader	Non-reader
Mean	60.32	98.08
Standard Deviation	18.81	18.54
	t - 7.005	

*t value must exceed 2.01 to be significant at the five per cent level of confidence.

Table 15

Design Means for the Reader and Non-reader Subjects: t values*

Design	Reader	Non-reader	Difference	t value
1	7.80	10.00	2.20	1.
2	5.76	14.80	9.04	4.
3	9.52	12.40	2.88	2.00
4	6.64	10.28	3.64	2.60
5	5.24	8.00	2.76	2.80
6	8.60	13.28	4.68	3.75
7	11.36	18.08	6.72	3.40
8	5.40	11.24	5.84	4.45

*t value to be significant at the five per cent level must exceed 2.01.

It is interesting to note that the mean Bender score of the reader group was calculated to be 60.32, a score which is somewhat lower than the mean Bender score for a group of normal children used by Pascal

and Suttell in their standardization studies (Mean 91.00.)[3]

In view of the results obtained in this study, the hypothesis that significant differences exist between reproductions of the Bender-Gestalt designs by reader and non-reader children can be accepted with confidence. Further it can be concluded that the differences which occur between the two groups do not result from chance fluctuations in sampling.

The results of this phase of the study further support the formulations of Bender, Pascal and Suttell, Kleinman, and Simpson that differences in Bender reproduction may be assigned directly to "interpretative factors." A more complete discussion of the results follows in the next chapter.

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[3]G. R. Pascal and B. J. Suttell, The Bender-Gestalt Test: Quantification and Validity for Adults. (New York; Grune and Stratton, 1951), pp. 42-43.

CHAPTER IV

DISCUSSION OF RESULTS

The purpose of this investigation was to study some of the factors in the Bender-Gestalt reproductions of readers and non-readers. Pascal and Suttell postuate that three factors are involved in the reproduction of the Bender-Gestalt: (1) sensory perception, (2) interpretation, and (3) motor reproductions. They assign differences in Bender-Gestalt reproduction to "interpretative factors" which obtrude between sensory perception and motor reproductions. They contend that the ability to perceive the designs and the ability to reproduce them play only an incidental role in the reproduction of the designs. . ." in individuals of normal intelligence without demonstrable brain damage . . ."[1] Differences, then, become a matter of what Pascal and Suttell term an "attitude," that is, what the designs and the task mean to the individual in light of his past experience. By assuming that deviations in response have their basis in deviations in the total responding organism, the given stimulating constellation of geometric forms may be used in more or less similar situations to study the gestalt function in various pathologically integrated conditions. Following this scheme, then, deviant

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[1]G. R. Pascal and B. J. Suttell, The Bender-Gestalt Test: Quantification and Validity for Adults. (New York; Grune and Stratton, 1951), pp. 42-43.

performance in the Bender-Gestalt-Motor Test is assigned to "interpretative factors."

In general, the results of this study support the hypothesis that differences in Bender-Gestalt reproduction between reader and non-reader children are assignable to "interpretative factors."

In view of the several factors under consideration, the basic hypothesis was considered, for convenience of presentation and discussion, as three related hypotheses, namely: (1) Reader and non-reader children differ significantly in copying twelve geometric figures; a cross, a star, a circle, a square, a vertical diamond, a horizontal diamond, an open square, a curve, a sinusoidal curve, a rotated sinusoidal curve, a horizontal hexagon, and a rotated hexagon. (2) Reader and non-reader children differ significantly in discrimination in the perceptual phase of the Bender-Gestalt. (3) Reader and non-reader children differ significantly in their reproductions of the Bender-Gestalt designs. These three hypotheses were related to the three factors of test response on the Bender-Gestalt-Motor Test which would seem to be capable of differentiating between reader and non-reader children.

The differences found between the two groups for the twelve geometric figures can be attributed to chance, for the findings fail to support the hypothesis concerning differences in motor performance maturity in reader and non-reader subjects. Therefore, the assumption of no difference in motor performance maturity between reader and non-reader subjects seems to be clearly supported. The basic data derived from the scoring of the reproductions of the simple geometric figures failed to differentiate the two groups. It can be stated, then, with confidence that differences in reproduction of geometric forms must be due to factors

other than the motor capacity required to reproduce them. Hypothesis one, may therefore, be rejected with confidence.

Consistent with the formulations of Pascal and Suttell[2] and the findings of Kleinman[3] and Simpson[4] no significant difference was found to exist between the reader and non-reader subjects in the perceptual phase of the Bender-Gestalt. The assumption of no difference in perceptual discrimination between the reader and non-reader groups seems to be clearly supported as the evidence indicates that the designs were perceived by both groups in a similar fashion. Further, there was no significant difference between the groups in their ability to select a replica and a slightly distorted replica of the Bender designs from two more grossly distorted replicas. In both of the perceptual discrimination tasks presented the reader and non-reader groups exhibited a somewhat similar ability to discriminate between the designs. In light of the findings of the perceptual phase, Hypothesis Two may be rejected.

Hypothesis Three, regarding differences in reproduction of the Bender designs by reader and non-reader subjects was confirmed by the results obtained by applying Student's t-test to the group design means. The reader group's deviation pattern was smaller than that usually seen in adults. The magnitude of the scorable deviations consistently favored

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[2]Pascal and Suttell, op. cit., p. 8.

[3]Bernard Kleinman, "A Study of Factors Involved in the Reproduction of Bender Designs in Normal and Schizophrenic Subjects," (unpublished Ph.D. dissertation, Dept. of Psychology, University of Oklahoma, 1955), p. 52.

[4]William H. Simpson, "A Study of Some Factors in the Bender-Gestalt Reproductions of Normal and Disturbed Children." (Unpublished Ph.D. dissertation, Dept. of Psychology, University of Oklahoma, 1958), p. 68.

the non-reader group.

In understanding the difference found between the reader and non-reader subjects Pascal and Suttell suggest that deviations in performance may be assigned to "interpretative factors." They consider impairment of the gestalt function to be related to the integrative capacity of the organism, the ego.[5] In their scoring system, Pascal and Suttell consider high scoring records to be indicative of little ego strength; ". . . ego strength lies on a continuum from very low to very high B-G scores."[6] Ego strength is in part related to feelings of security regarding one's ability to meet the demands of a situation. Little ego strength on the other hand can be thought of in terms of having insecure feelings in relation to one's ability to perform satisfactorily.

The relationship of insecurity to reading difficulties can be seen in the following statement of Brueckner and Bond:

> These children have developed blockings and tensions that make them ineffective learners. They are in a downward spiral that causes increasing tensions and ever greater inefficiency in learning. These children demonstrate worry and fear in any reading situation and they frequently demonstrate a lack of desire to learn to read. They have an antagonism toward reading and they are embarrassed about reading. They are frequently lower in oral reading than in silent reading, because their insecurity increases when they demonstrate their inadequacy in reading . . .[7]

In this connection, it should be pointed out that copying of the Bender designs can be viewed by the subject as a way of exposing his

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[5]Pascal and Suttell, op. cit., p. 6.

[6]Ibid., p. 9.

[7]Leo Brueckner and Guy Bond, The Diagnosis and Treatment of Learning Difficulties. (New York: Appleton-Century-Crofts, Inc., 1955) p. 120.

drawing inadequacies. The resulting tensions, therefrom, can be "projected" into their drawings in a form reflecting feelings of inadequate self or stated another way as "misinterpretations" of the basic gestalt due to personal factors. In a study of the relationship between personality and perception, Rubenstein found that the strength of internal factors in perception increase with impaired personality adjustment.[8]

Regarding the relationship of reading problems to personality adjustments Betts has this to say:

> . . . In some instances, children have emotional and personality problems that interfere with reading achievement. In other instances, frustration in reading situations has clearly produced the personality problem. The latter holds true in the majority of cases.[9]

When an individual is unable to adjust to the developmental task of reading he is likely to become emotionally involved to the extent that some of his ability to correctly "interpret reality" will be influenced or impaired. Pascal and Suttell assume that greater deviations from the stimuli could be found in those persons in whom the attitude toward reality is most disturbed and they assigned the deviations to "interpretative factors."[10] The Postulate advanced by Pascal and Suttell was confirmed by the present study in that a significant difference was found to exist between the reader and non-reader subjects in the "interpretative phase." Hypothesis Three, may therefore be accepted with confidence.

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[8]E. A. Rubenstein, "The Influence of Personality Integration on the Perceptual Process." (Unpublished doctoral dissertation, Catholic University, 1951.)

[9]E. A. Betts, Foundations of Reading Instruction. (American Book Company, 1946), p. 11.

[10]Pascal and Suttell, op. cit., p. 8.

On the basis of the findings of this study, the Bender-test, utilizing the Pascal and Suttell scoring criteria may prove to be useful in determining if reading problems are in large part due to personality or "interpretative" factors.

The data of Table 9 suggests the use of a cut off raw score of 86: that is, it would appear possible to identify correctly non-reader children of normal intelligence with about 84 per cent accuracy, if their scores exceeded this value. As a screening device a shortened form of the Bender-Gestalt Test would include designs 2, 6, 7, and 8.

CHAPTER V

SUMMARY AND CONCLUSIONS

The purpose of the present study has been to examine several assumptions concerning the reproduction of the Bender-Gestalt-Test designs using samples of reader and non-reader children. Theoretically, Pascal and Suttell postulate three factors essential to the reproduction of the Bender-Gestalt designs, namely, sensory perception, interpretation and motor reproduction.[1] These authors maintain that deviant performance on the Bender figures is a function of "interpretative factors" which obtrude between the ability to perceive the figures and motor ability involved to reproduce them. Pascal and Suttell believe that what is being measured by the Bender-Gestalt-Motor Test when used with individuals of normal intelligence, free of demonstrable brain damage, is some factor other than the ability to perceive the figures and the ability to reproduce them. Deviations in response are assumed to have their basis in deviations in the total responding organism. Accordingly, the stimulating constellation of Bender designs may be used to study the gestalt function in various pathologically integrated conditions. Greater deviations from the stimuli would be expected in those persons in whom the

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[1] G. R. Pascal and B. J. Suttell, The Bender-Gestalt Test: Quantification and Validity for Adults. (New York; Grune and Stratton, 1951), p. 6.

attitude toward reality is influenced or impaired by personality factors. The deviations obtained would be assigned to "interpretative factors." To test the general hypothesis that differences in Bender-Gestalt reproduction exhibited by reader and non-reader children are related to the interpretative phase of the Bender-Gestalt, three separate hypotheses were formulated: (1) Reader and non-reader children differ significantly in ability to copy twelve selected geometric figures; (2) Reader and non-reader children differ significantly in discrimination in the perceptual phase of the Bender Gestalt; (3) Reader and non-reader children differ significantly in their reproductions of the Bender-Gestalt designs.

Twenty-five reader and twenty-five non-reader first grade boys of average intelligence were exposed to identical experimental conditions. They were required to reproduce (copy) six simple geometric figures which varied in level of difficulty; namely a circle, a cross, a star, a square, a vertical diamond, and a horizontal diamond along with six designs which were component parts of some of the Bender designs. The latter six drawings mentioned were the open square (design 4), the curve (design 4), the horizontal and rotated sinusoidal curves (design 6), the rotated hexagon (design 7), and the horizontal hexagon (design 8.) These twelve figures were utilized as a measure of motor performance maturity. In addition to these they were required to reproduce all nine of the geometrid figures of the Bender-Gestalt-Motor Test individually on separate four-inch by six-inch white cards, each time using a freshly sharpened pencil. Following the administration of the simple geometric figures and the Bender-Gestalt designs, the subjects were presented with nine sets of stimulus figures, each consisting of four designs mounted on white cardboard.

The four designs included a replica of the regular Bender design and three replicas of Bender drawings reproduced by six-year-old children. Two of the replicas reproduced by the six-year-olds varied in distortion from each other and each was more distorted than the third which was only a slight distortion from the original design. On presentation of each set of stimulus figures, the subjects were asked to "Choose the one which is the same as the one you were shown to copy; choose the one which is just like the one you were shown to copy." Each of the sets of stimulus figures were presented again with the directions "Pick out the two that are the most alike; which two look almost the same." The selections were recorded on data sheets.

The general hypothesis derived from the Pascal and Suttell formulations was confirmed by an analysis of the data.[2] In first grade boys of average intelligence, deviant performance in the reproduction of the Bender designs may be directly assigned to "interpretative factors."

Pascal and Suttell postulate that deviant performance on the Bender-Gestalt is not related to the motor ability involved to reproduce the figures in individuals of normal intelligence and who are free of demonstrable brain damage. When accuracy of reproduction of the twelve selected geometrical figures was analyzed, Hypothesis one was rejected. No significant difference was found to exist in motor performance maturity between the reader and non-reader subjects.

The perceptual phase findings were consistent with the Pascal and Suttell postulate that no difference exists between reader and non-reader subjects in discriminative behavior. The reader and non-reader

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[2] Ibid.

subjects showed similar abilities to discriminate between designs. Furthermore, the findings in the perceptual phase is consistent with the findings of Kleinman[3] and Simpson[4] in studies utilizing perceptual discrimination tasks similar to the ones used in the present study. Both Kleinman and Simpson ruled out the perceptual aspect and assigned differences in performance on the Bender designs to the interpretative function.

A significant difference between the Bender reproductions of the reader and non-reader groups was found to exist. Having demonstrated that the reader and non-reader groups are similar in both motor ability required to reproduce the designs and in discriminative ability, one can assume, with Pascal and Suttell, that deviant performance in the reproduction of the Bender designs may be assigned directly to "interpretative factors."

Although this study supports the clinical utility of the Bender Test, it must be kept in mind that the use of raw scores does not permit the utilization of the more refined Standard (Z) scoring for clinical identification recommended by Pascal and Suttell.[5] The results of this study suggest that scores ranging above 86 would seem capable of differentiating the reader and non-reader subjects at an 84 per cent accuracy

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[3]Bernard Kleinman, "A Study of Factors Involved in the Reproduction of Bender Designs in Normal and Schizophrenic Subjects," (unpublished Ph.D. dissertation, Dept. of Psychology, University of Oklahoma, 1955), p. 52.

[4]William H. Simpson, "A Study of Some Factors in the Bender-Gestalt Reproductions of Normal and Disturbed Children." (Unpublished Ph.D. dissertation, Dept. of Psychology, University of Oklahoma, 1958), p. 68.

[5]Pascal and Suttell, op. cit., pp. 34-36.

level. Since this score is somewhat lower than the adult norm[6] and somewhat lower than the norm derived by Simpson[7] the clinician should proceed with caution until further research on this factor is made and the discrepancies clarified.

In view of the findings of this study, the following conclusions seem warranted.

1. Reader and non-reader first grade boys of average intelligence do not differ significantly in copying ability.

2. Reader and non-reader first grade boys of average intelligence do not differ significantly in discrimination in the perceptual phase of the Bender-Gestalt.

3. Reader and non-reader first grade boys of average intelligence differ significantly in their reproductions of the Bender-Gestalt designs.

4. Deviant performance on the Bender-Gestalt designs may be assigned to "interpretative factors."

5. Clinical utility of the test with young children seems confirmed. The test seems capable of differentiating between reader and non-reader first grade boys when certain modifications of the Pascal and Suttell scoring system are utilized.

Implications for Research

One interesting implication of this study for further research can be seen in the subjects reproductions of two of the simple geometric

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[6] Ibid., p. 43.

[7] Simpson, op. cit., p. 54.

figures, namely the rotated hexagon (design 7) and the horizontal hexagon (design 8.) Both groups made substantial errors in reproducing these designs. Perhaps further research on these designs at different age levels will reveal the age level at which these designs can be produced satisfactorily and will add to our knowledge regarding the meaning of children's copying ability at various age levels.

Another research area would be the application of the present design to a first grade female population as a check on both maturational factors and sex differences.

Something can be said for administering a clinical tool in a standard fashion, therefore, it would appear justifiable to modify future research in the use of the Bender Test with children to include the over-all configuration of the designs drawn on a single page.

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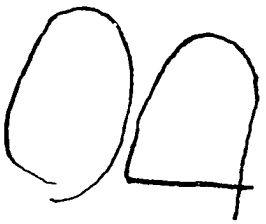
APPENDIX A

PERCEPTUAL PHASE DESIGNS

Bender-Gestalt Design A



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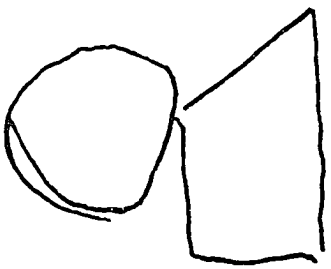

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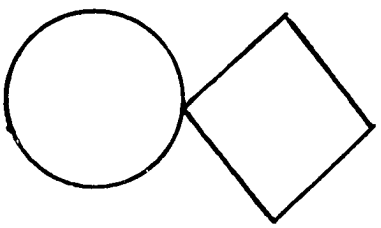

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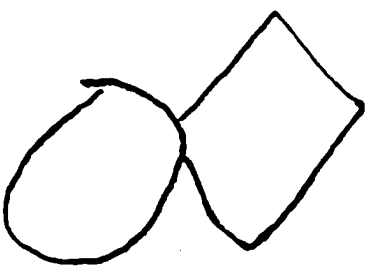

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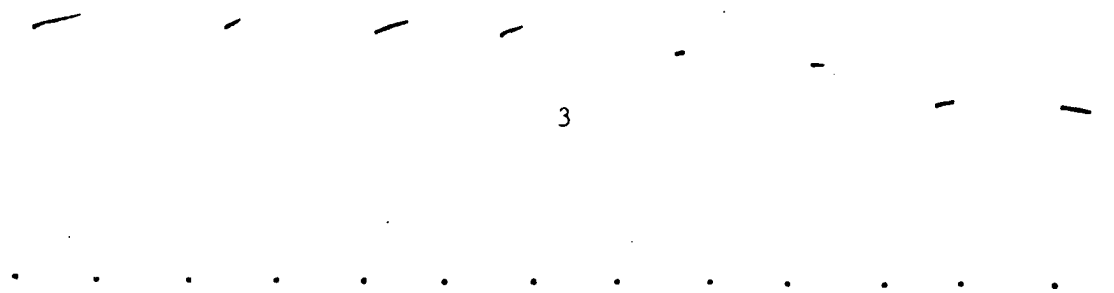

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Bender-Gestalt Design 2



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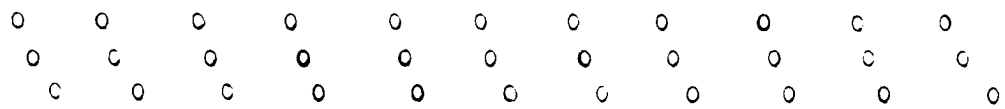

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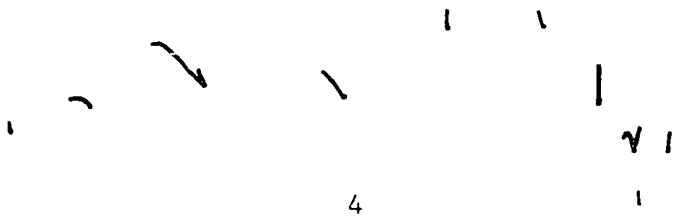

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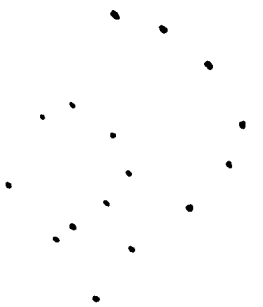

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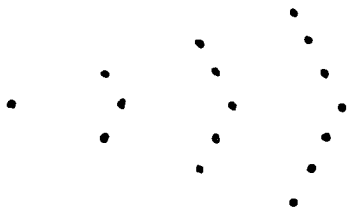

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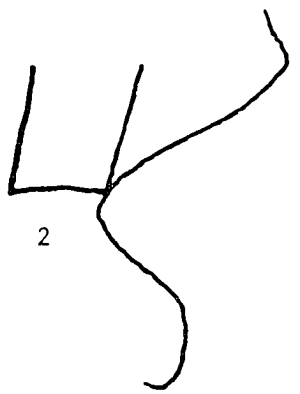

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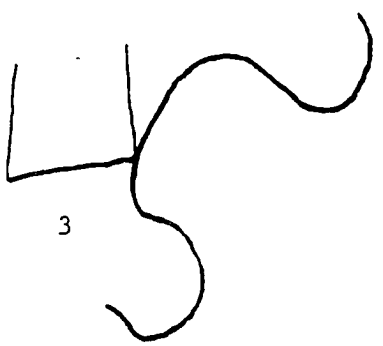

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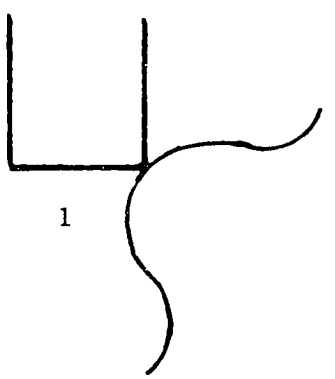

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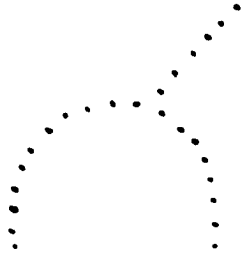

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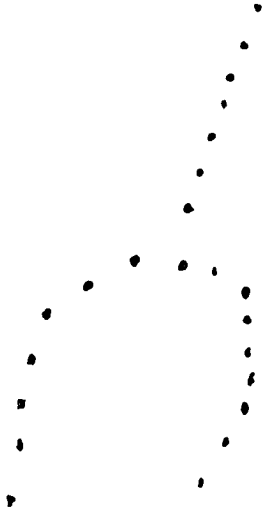

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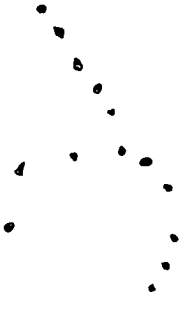

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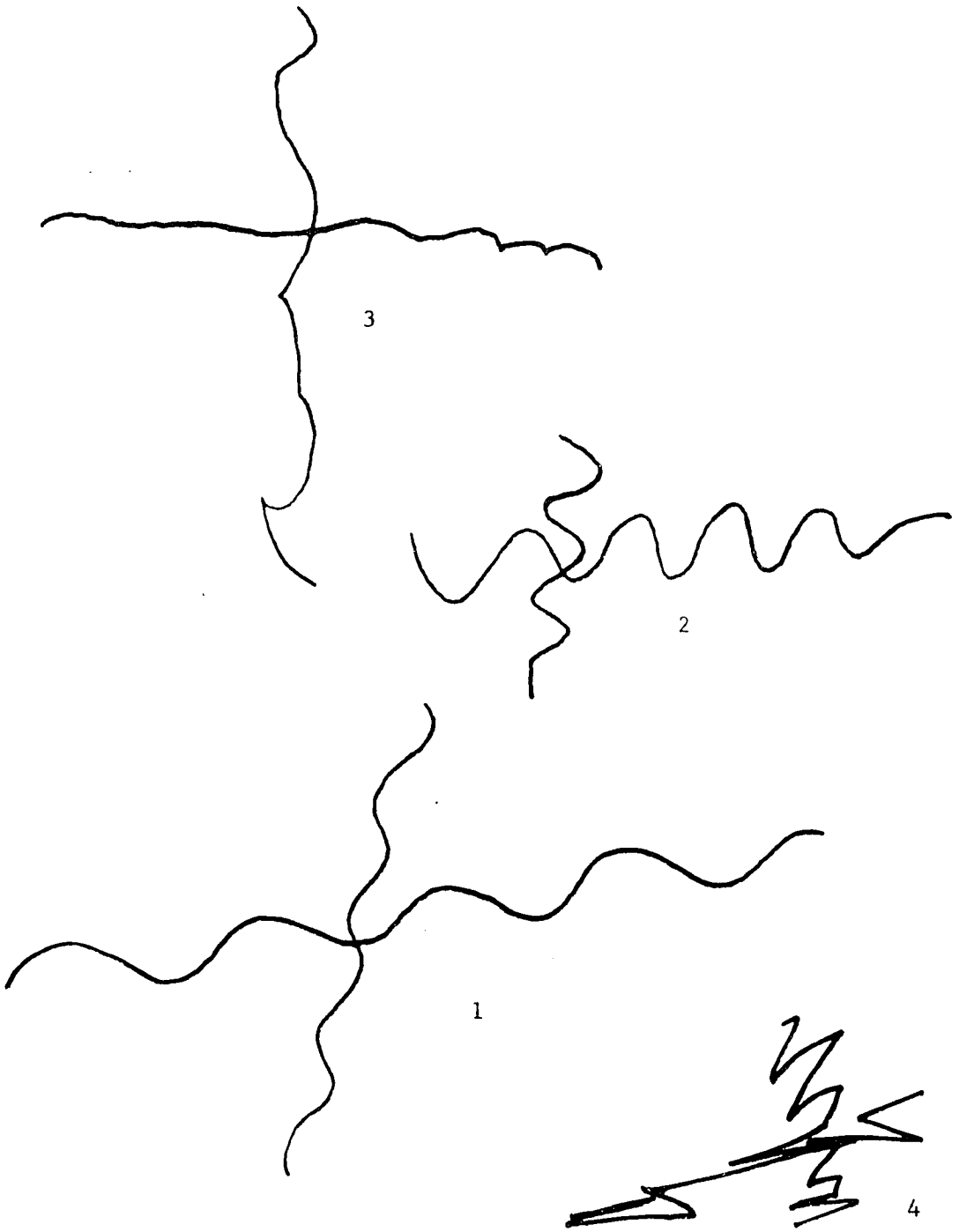

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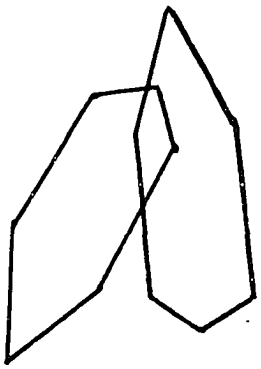

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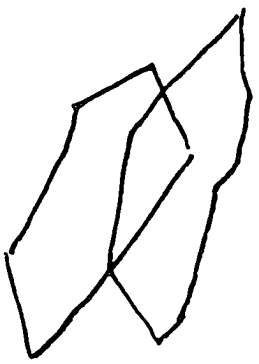

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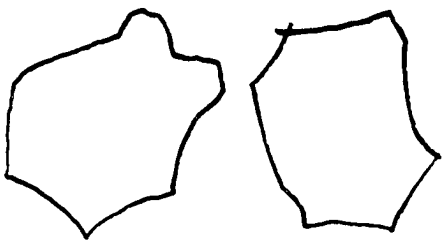

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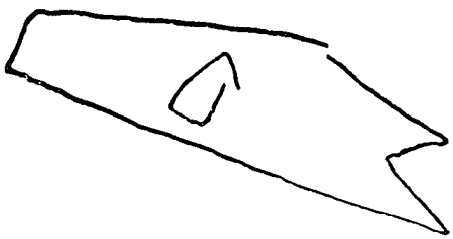

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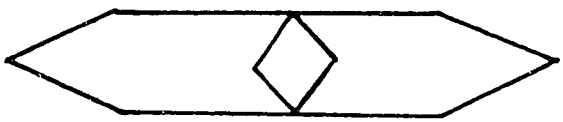

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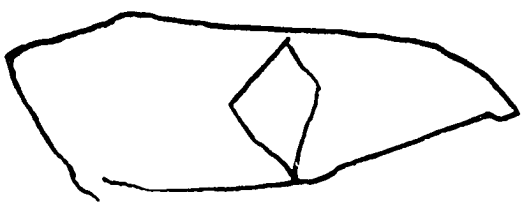

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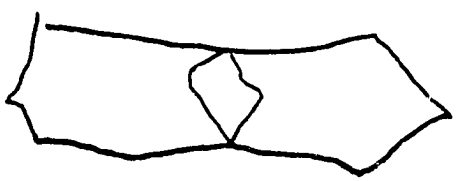

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APPENDIX B

BENDER-GESTALT SCORE SHEET

Date .....

SCORE SHEET—BENDER-GESTALT TEST

Name ..... Age ..... Sex .....

Education ..... I.Q. ..... Diagnosis .....

DESIGN 1		*DESIGN 4*		*DESIGN 7*	
1. Wavy line (2)	.....	1. Asym. Crv. (3)	.....	1. Ends no. join. (8)	.....
2. Dot, dash, cir. (3)	.....	2. Break crv. (4)	.....	2. Angles ext. (3)	.....
3. Dashes (2)	.....	3. Crv. not center. (1)	.....	3. Angles miss. (3)	.....
4. Circles (8)	.....	4. Curls (4)	.....	4. Ext. scat. (3)	.....
5. No. dots (2) each	.....	5. Not joined (8)	.....	5. Dbl. line (1 ea.)	.....
6. Dbl. row (8)	.....	6. Crv. rotation (3)	.....	6. Tremor (4)	.....
7. Workover (2)	.....	7. Touch-up (8)	.....	7. Distortion (8 ea.)	.....
8. Sec. attempt (3 ea.)	.....	8. Tremor (4)	.....	8. Guide lines (2)	.....
9. Rotation (8)	.....	9. Distortion (8)	.....	9. Sec. attempt (3 ea.)	.....
10. Des. miss. (8)	.....	10. Guide lines (2)	.....	10. Rotation (8)	.....
Design Total	.....	11. Sec. attempt (3 ea.)	.....	11. Des. miss. (8)	.....
		12. Rotation (8)	.....	Design Total	.....
		13. Des. miss. (8)	.....		
		Design Total	.....		

DESIGN 2		*DESIGN 5*		*DESIGN 8*	
1. Wavy line (2)	.....	1. Asymmetry (3)	.....	1. Ends no. join. (8)	.....
2. Dash or dots (3)	.....	2. Dot, dash, cir. (3)	.....	2. Angles ext. (3)	.....
3. Shape cir. (3)	.....	3. Dashes (2)	.....	3. Angles miss. (3)	.....
4. Cir. miss., ext. (3)	.....	4. Circles (8)	.....	4. Ext. scat. (3)	.....
5. Cir. touch. (5)	.....	5. Ext. join. dot (2)	.....	5. Dbl. line (1 ea.)	.....
6. Dev. slant (3)	.....	6. Ext. rotation (3)	.....	6. Tremor (4)	.....
7. No. col. (2 ea.)	.....	7. No. dots (2)	.....	7. Distortion (8 ea.)	.....
8. Fig. on 2 lines (8)	.....	8. Distortion (8)	.....	8. Guide lines (2)	.....
9. Guide lines (2)	.....	9. Guide lines (2)	.....	9. Workover (2)	.....
10. Workover (2)	.....	10. Workover (2)	.....	10. Sec. attempt (3 ea.)	.....
11. Sec. attempt (3 ea.)	.....	11. Sec. attempt (3 ea.)	.....	11. Rotation (8)	.....
12. Rotation (8)	.....	12. Rotation (8)	.....	12. Des. miss. (8)	.....
13. Des. miss. (8)	.....	13. Des. miss. (8)	.....	Design Total	.....
Design Total	.....	Design Total	.....		

DESIGN 3		*DESIGN 6*		*CONFIG. DESIGN*	
1. Asymmetry (3)	.....	1. Asymmetry (3)	.....	1. Place. Des. A. (2)	.....
2. Dot, dash, cir. (3)	.....	2. Angles (2)	.....	2. Overlap (2 ea.)	.....
3. Dashes (2)	.....	3. Pt. crossing (2 ea.)	.....	3. Compression (3)	.....
4. Circles (8)	.....	4. Crv. extra (8)	.....	4. Lines drawn (8)	.....
5. No. dots (2)	.....	5. Dbl. line (1 ea.)	.....	5. Order (2)	.....
6. Extra row (8)	.....	6. Touch-up (8)	.....	6. No order (8)	.....
7. Blunting (8)	.....	7. Tremor (4)	.....	7. Rel. size (8)	.....
8. Distortion (8)	.....	8. Distortion (8)	.....	Total	.....
9. Guide lines (2)	.....	9. Guide lines (2)	.....	*DESIGN TOTALS*	
10. Workover (2)	.....	10. Workover (2)	.....	1.	5. .....
11. Sec. attempt (3 ea.)	.....	11. Sec. attempt (3 ea.)	.....	2.	6. .....
12. Rotation (8)	.....	12. Rotation (8)	.....	3.	7. .....
13. Des. miss. (8)	.....	13. Des. miss. (8)	.....	4.	8. .....
Design Total	.....	Design Total	.....	Config.	.....

Total Raw Score ..... Standard Score .....