AN INVESTIGATION OF THE BENDER VISUAL MOTOR GESTALT TEST ON NEGRO GROUPS UTILIZING PASCAL'S SCORING TECHNIQUE

A Thesis

Presented to the

Faculty of the Graduate School

of the University of Houston

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

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by

Rafael Nunez

June, 1952

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ABSTRACT

Purposes of the Study. The purpose of this study is to determine the difference of scorable records of visual motor perception to the Bender Visual Motor Gestalt Test of a sample of nonpatients and psychiatric groups, by using Pascal's quantitative system of scoring.

Testing Procedure. The Bender Visual Motor Gestalt Test was used as an instrument for measuring visual motor perception, and Pascal's system of scoring records obtained was used to find the validity of the Bender Visual Motor Gestalt Test in discriminating the records of normal individuals and psychiatric patients.

Subjects. The Bender Visual Motor Gestalt Test was administered to a total of 175 subjects who ranged in age from 13 to 62 years with a mean age of 37.5. Fifty normals and 125 psychiatric patients were tested.

Results. All records were scored following Pascal's quantitative system of scoring the Bender Visual Motor Gestalt Test. The significant differences are briefly given below.

Normal group and Psychiatric group. The Psychiatric group records scored higher in Pascal's system of scoring the Bender Visual Motor Gestalt test. This result is in agreement with Pascal's statement that high scores are indicative of little ego strength.

Pre-control and Post-control groups. No significant difference between the two groups was found.

Pre-lobotomy and Post-lobotomy groups. There was no significant difference between the two groups.

Post-lobotomy and Pre-control groups. No significant difference between the two groups was found.

Post-lobotomy and Post-control groups. There was no significant difference between the two groups.

Pre-lobotomy and Deteriorated Organic groups. The deteriorated organic group scored higher than the pre-lobotomy group.

Post-lobotomy and Deteriorated Organic groups. The deteriorated organic group scored higher than the post-lobotomy group.

Pre-control and Deteriorated Organic groups. The deteriorated organic group scored higher than the pre-control group.

Post-control and Deteriorated organic groups. The deteriorated organic groups scored higher than the Post-control group.

Conclusions.

The psychiatric group scored higher in Pascal's system of scoring quantitatively the Bender Visual Motor Gestalt Test.

The study of reliability of the scoring system yielded a reliability coefficient of .84 for the raw scores and .88 for Z scores on testing and retesting of 30 psychiatric cases.

The analysis of variance study was used to estimate the validity of the test and indicated that there is significant difference among the groups compared, namely: normal, psychiatric, post-lobotomy and deteriorated organic. The F ratio showed significance beyond 1% level of confidence.

ACKNOWLEDGMENT

I wish to express my sincere thanks and gratitude to Dr. Daniel E. Sheer, under whose guidance this study was made and also to the other members of the advisory committee, namely, Dr. J. L. McCary, and Dr. L. S. McGaughran for their helpful, untiring assistance.

Acknowledgment is made to all those who helped in many different ways to make this study possible, especially to Mr. C. Monroe Fairchild and Mr. Douglas R. Talcott.

Rafael Nunez

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CHAPTER I

INTRODUCTION

The Bender Visual Motor Gestalt Test is a widely known perceptual motor test and one that is used in various hospitals and clinics by clinical psychologists and psychiatrists who consider this test of value. This test is based to a great extent on gestalt concepts. Geometrical designs, which are composed of lines, angles, and curves combined in a great number of relationships are derived from Wertheimer's configurations.[1]

Since its publication fourteen years ago, the Bender Visual Motor Gestalt Test has received increasing attention as a projective medium. Bender wrote in 1938, "The final product of copying forms is a visual motor pattern which reveals modifications in the original pattern by the integrating mechanism of the individual who has experienced it."[2] From that time on, problems concerning the application of the test have been resolved as follows:

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[1] Bender, Lauretta, A Visual Motor Gestalt Test and Its Clinical Use, New York, American Orthopsychiatric Association, 1938.

[2] Bender, Lauretta, "Psychological Principles of the Visual Motor Gestalt Test," New York Academy of Science, 11: 164-170, 1950.

1. Establishment of an objective scoring scheme.

2. Relation of the above to the personality organization.

3. To obtain some measure of the test's reliability and validity by comparing known groups.[3]

The Bender Visual Motor Gestalt Test is based on the concept that accurate visual-motor perceptual behavior is a skillful act. This perceptual act is considered to include a sensory reception, a central neural interpretation and motor reproduction (hand drawing) by the subject perceiving the test stimulus objects. Bender claims that the total perceptual process can be distorted by neural injury, by variations in the intellectual level, and by maladjustments in the emotional organization of the subject.

The test's use has become increasingly more widespread, not only to diagnose organic brain damage, but also schizophrenia and certain behavior disorders as well. Eight studies have been concerned with the major problems of interpretation, validation and scoring.*

Pascal's method of quantification for adults was used in this study. Since the purpose of clinical tests is to save time in diagnosis and therapy, his system was chosen both because of its quantitative score and because of its facility in scoring.

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[3] Billingslea, F. Y., "The Bender Gestalt Test - An Objective Scoring Method and Validating Data," Journal of Clinical Psychology, 4:1-28, 1948.

* Barkley's, Billingslea's, Hanvik's, Harrimans' Kitay's, Pascal's, Sullivan's, and Bensberg's. (See Bibliography).

This study is concerned with: (1) an evaluation of the reliability of Pascal's quantitative scoring technique; and (2) an examination of the validity of the Bender Visual Motor Gestalt Test in discriminating between normal, psychiatric and organic groups.

CHAPTER II

RELATED STUDIES

The test has not amassed an impressive bibliography, but some studies are reported which show some promise for the Bender Visual Motor Gestalt Test as a clinical instrument.

Orenstein and Schilder[4] had patients draw the figures in the test before and after insulin-shock treatment. They report that there were fewer destructions of the Gestalt principles in the post-shock stage.

Stainbrook and Lowenbach[5] gave this test during periods of post-convulsive reintegration. The drawings were repeated at different intervals after the convulsion. They noted that early attempts of Gestalt figure drawings resulted in primitive loops, and that there was a progressive improvement in drawing with recovery from the convulsive attack.

Hutt[6] used the test extensively in the Army and has added some concepts that were not present in Bender's original formulations. He suggested that it is sometimes helpful to have the individual comment on

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[4] Orenstein, L. I., and Schilder, Paul, "Psychological Considerations of Insulin Treatment in Schizophrenia," Journal of Nervous and Mental Diseases, Vol. 88, 1938.

[5] Stainbrook, E. J., and Lowenbach, H., "Writing and Drawing of Psychotic Individuals after Electrically Induced Convulsions," Journal of Nervous and Mental Diseases, Vol. 99, 1944.

[6] Hutt, Max L., "A Tentative Guide for the Administration and Interpretation of the Bender Visual Motor Gestalt Test," U. S. Army: Adjutant General School; (General's) 1945.

each of the figures when he has completed it or at the end of the entire test. He also suggests asking the subject to tell him what the drawings remind him of and to "modify them in any way he feels will make them 'nicer'".[7] In this way symbolic material and fantasy content is evoked in the test.

Israel Wechsler has included the Bender-Gestalt Test in his sixth edition of "A Textbook of Clinical Neurology",[8] where he writes: "The clinical use of this test depends upon the fact that visual-motor organization is a maturation process which may be arrested, regress after maturity is reached, or be variously affected by neuropsychiatric disorders."

The Bender-Gestalt Test, together with the abbreviated Thematic Apperception Test and the Group Rorschach Test, were administered by Wayne, et al,[9] to inmates of a military disciplinary barrack in an effort to determine homosexual tendencies in these men. Overt homosexuals were matched with a control group of non-homosexuals picked at random. The authors found that the Bender Gestalt Test revealed sexual conflicts, but the exact nature of these conflicts could not be determined.

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[7] Ibid

[8] Wechsler, I., A Textbook of Clinical Neurology (6th edition) Philadelphia: W. B. Saunders Co., 1947.

[9] Wayne, D. M., Adams, M., and Rowe, L. A., "A Study of Military Prisoners at a Disciplinary Barracks Suspected of Homosexual Activities," Military Surgeon, Vol. 101, 1947.

A different departure from the application of visually perceived Gestalten is Barkley's[10] introduction of the Hapto-Kinesthetic Gestalt Test for the investigation of brain injuries. He uses plastic cards which contain exact reproductions of Bender's Gestalt figures which are raised in relief one-sixteenth of an inch in height. A subject has to feel the designs and draw what he has felt. After the Hapto-Kinesthetic Test has been completed, the regular Bender-Gestalt Test is administered under standard conditions. Barkley says:

> Only a minor pilot study has been run to date, but there appear to be marked and significant difference between the performances of the brain damaged and of normal subjects. It has also been found that many subjects suffering from organic brain pathology who give a good reporduction of the visual stimuli exhibit marked distortion on the reproductions of the Hapto-Kinesthetic perceptions.

Barnes,[11] in an effort to aid the interpretation of the electroencephalogram by psychological test gave the Rorschach, Hunt, and Bender-Gestalt Test immediately before and after electroencephalogram, and found perseveration and distortion of designs in the Bender-Gestalt Test with abnormal electroencephalograms.

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[10] Berkley, Bill J., "A Note on the Development of the Western Reserve Hapto-Kinesthetic Gestalt Test," Journal of Clinical Psychology, Vol. 5, 1949.

[11] Barnes, T. Cunliffe, "Electroencephalographic validation of the Rorschach, Hunt, and Bender-Gestalt Tests," American Psychologist, 5, 322-Abstract, 1950.

Kitay, [12] proposed an objective scoring method for the Bender-Gestalt Test based upon deviation of the results from standard figures. The scoring method was found to have high reliability. The V-score which measures intra-individual variability is related to the degree of adherence to, or departure from form elements. The D-score, representing tendencies toward expansion or contraction of the test figures, seems to indicate the relative control or lack of control of affect.

Mouyer, et al, utilized the Bender-Gestalt Test for determining the mental level of children and adults and found that the results of the Bender-Gestalt Test are in close correspondence with those of the Binet-Simon, and slightly superior to those of the Stanford-Terman, as far as determining mental level.[13]

Rutt,[14] in his tentative guide presents clinical syndromes, which are presented here, considering them of great importance:

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[12] Kitay, Julian I. (Princeton U., N. J.) "The Bender-Gestalt Test as a projective technique," Journal of Clinical Psychology, 6, 170-174, 1950.

[13] Mouyer, et al, "Le test de Lauretta Bender", Enfance, 2,209-305, 1949.

[14] Rutt, Max L., "The Use of Projective Methods of Personality Measurement in Army Medical Installations," Journal of Clinical Psychology, Vol. I, 1945.

a. The Psychoneurotic. (Findings based on 130 carefully selected psychoneurotic cases compared with 40 "control" cases.)

(1) Neither destruction of gestalt nor rotation are present.

(2) Ocassionally there are manifestations of regression, perseveration, and fragmentation.

(3) Most striking are:

(a) Reduction in size (ocassionally increase in size).
(b) Phallic symbols, sexual difficulty.
(c) Change in curvature values.
(d) Difficulty with crossings and closure.
(e) Condensation and simplification.
(f) Reversals.
(g) Angulation.

(4) Marked resistance to the test or parts of it, emotional exclamations, mild disturbance in spatial relations, motor incoordination.

b. The Schizophrenic. Manifestations will vary markedly in accordance with the type and severity of the disturbance.

(1) Most significant general findings are:

(a) Rotation
(b) Regression and dissociation.
(c) Fragmentation.
(d) Elaboration.
(e) Destruction of the gestalt.
(f) Chaotic or confused order.
(g) Gross misuse of space.
(h) Flattening.
(i) Blocking.
(j) Exaggeration of phallic parts.

c. The Brain Injured Patient. Manifestations vary in accordance with the nature and extent of the brain damage. Most important are:

(1) Partial rotations.
(2) Loss of detail.
(3) Vagueness and sketchiness.
(4) Marked Perseveration.
(5) Exclamations and behavior involving impotency, perplexity, and incompetence.

Hanvik and Anderson[15] administered the Bender Gestalt to a group of brain damaged patients in each of which the place of the cerebral lesion had been made known by surgery or through X-ray verification. The total group of 44 patients was made up of 20 patients with lesions in the "dominant" hemisphere (presumed to be the left hemisphere in right-handed persons) and 24 patients with lesions in other or "non-dominant" hemisphere. They found that the only significant difference between the brain damaged group and control group (patients whose presenting complaint on admission to the hospital was low back pain) was on percentage of cases rotating the Bender figures. The brain-damaged group exceeded the control group significantly in this characteristic.

Bensberg[16] administered the Bender-Gestalt Test to 322 mental defectives. One hundred and sixty-one brain-injured mental defectives were matched for mental and chronological age with an equal number of defectives having a familial or hereditary etiology. The test was scored for accuracy with the following findings:

> The familial group were significantly more accurate in their reproductions than the brain-injured.
> The Pearson correlations for accuracy and mental age ranged from .64 to .80.

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15 Hanvik, L. J. and Anderson, A. L., "The Effect of Focal Brain Lesions on Recall and on the Production of Rotation in the Bender-Gestalt Test," Journal of Consulting Psychology, 14: 197-198, 1950.

16 Bensberg, Gerard J., "Performance of Brain-Injured and Familial Mental Defectives on the Bender-Gestalt Test," Journal of Consulting Psychology, Vol. 16, No. 1 61-64, February, 1952.

> Of the eight characteristic treated by the chi-square technique, (one or more complete reversals, parts present but incorrectly placed, parts omitted, parts repeated, use of numbers, stars, etc., use of lines on Fig. 5 instead of dots, two or more erasures, and elevations or repression of Fig. 1 and 2) reversals, parts repeated and the use of lines instead of dots were found to occur significantly more frequently in the brain-injured.

In a recent study, Klopfer and Suczek[17] projected each of the Bender-Gestalt Test figures on a movie screen for two and a half minutes. The subjects were asked to write down every feeling, thought, reaction, etc., that came into their awareness while looking at the figures. The experimenters interpreted the associations in the same manner as a TAT might be interpreted, i.e., "by combining the modes of perception, affects, points of interest, etc., explicitly stated in some associations, with those implied in other associations." This inferential analysis, the investigators found, yielded more meaningful results than a simple enumerative or quantitative tabulation of the associations. They concluded that:

> the study was helpful in making explicit more of the cues used by the psychologist in interpreting test results, and in avoiding distortion due to the interpreter's own associations.[18]

Billingslea[19], in his study of the Bender-Gestalt Test, found

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17 Klopfer, Walter G., and Suczek, Robert F., "Interpretation of the Bender-Gestalt Test: The Association Value of the Figures", American Journal of Orthopsychiatry, Vol. XXII, 4, 1952.

18 Ibid

19 Billingslea, F. Y., "The Bender-Gestalt: An Objective Scoring Method and Validating Data", Journal of Clinical Psychology, Monograph No. 1, 1938.

psychoneurotics do not seem to produce specific deviations in their visual-motor functions and he stated that;

> ". . . the general conclusion from this sampling must support Bender that a clear syndrome for distinguishing the psychoneurotic test record can not be established."

The greater part of Billingslea's paper dealt with scoring methods and establishment of reliability and validity. He measured angles and curves and computed spatial deviations. His method requires a great deal of work on the part of the examiner and he considers it consumes more time than the end result would seem to justify.

In his work Pascal[20] presents scoring ideas for the Bender Visual Motor Gestalt Test, reliability, validity and clinical findings. These are derived from applying his method to questions of differences in sex, age, education, intelligence, organic brain integrity, primary neurosis and primary psychosis. On the whole, his work portrays a great advance in dealing with the Bender Visual Motor Gestalt Test. This method of scoring is the one used in this study and will be dealt with in greater detail in the next chapter.

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[20] Pascal, Gerald R., "Quantification of the Bender-Gestalt: a preliminary report," American Journal of Orthopsychiatry, 20, 418-423, 1950.

CHAPTER III

EXPERIMENTAL DESIGN

Procedure. This study reports results obtained from the administration of the Bender-Gestalt Test to a normal population and mental hospital populations. The method of administration followed is that indicated in Hutt's Guide,[21] and the scoring system followed was the method devised by Pascal.

The standard card test figures employed by the experimenter were published by the American Orthopsychiatric Association, Inc. and Lauretta Bender.[22] These are pen and India ink drawings placed on 6" x 4" plain white cards.

The test materials included the standard card test figures, a quantity of 8½" x 11" white unruled mimeograph paper and a No. 2 pencil with an eraser. A hard, smooth table or desk was available so that the subject's reproductions were not governed by irregularities of the surface underneath the test paper.

The subject was seated to the examiner's left in such fashion that

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[21] Hutt, Max L., "A Tentative Guide for the Administration and Interpretation of the Bender-Gestalt Test." U. S. Army: Adjutant General's School, 1945.

[22] Bender, Lauretta, "A Visual Motor Gestalt Test and Its Clinical Use," Monograph No. 3 American Orthopsychiatric Association, New York, 1938.

continuous observation of his methods of work, comments, and behavior could be maintained with least effort.

The actual test figures were selected by Bender from Wertheimer's original figures. Nine designs constitute the test stimuli.

> Figure A is an introductory one. It consists of a continuous circle and a square placed on its vertex. It was chosen as an introductory figure because it soon became evident that it was readily experienced as closed figures on a background. According to Wertheimer, this configuration is recognized as two contingent figures because each represents a 'gute gestalt'. This principle overrules the principle that parts which are closer together are usually seen together. In this instance, the contiguous parts of the circle and square are closer to each other than the two sides of the square.
>
> Figure I, according to Wertheimer, should be so perceived that the dots appear as a series of pairs determined by the shortest distance, or with "remnants" left over at each end. Such a pairing would be more readily perceived if the differences in the distances had been greater. This is an example of a gestalt formed on the principle of proximity of parts.
>
> Figure II, according to Wertheimer, is perceived usually as a series of short slanting lines insisting of three units so arranged that the lines slant from left above the right below. It is also determined on the principle of proximity of parts. This is also true of Figure III.
>
> Figure IV is ordinarily perceived as two units determined by the principle of continuity of geometrical or internal organization; the open square with the bell-shaped form at the lower right-hand corner. The same principle holds for the introductory Fig. A and also for Fig. V which is seen as an incomplete circle with an upright slanting stroke made in dotted lines.
>
> Figure VI is seen as two sinusoidal lines with different wave lengths, crossing each other at a slant.
>
> Figure VII and VIII are two configurations made up of the same units, but they are rarely perceived as such, because in Figure VIII the principle of continuity of geometric forms prevails--which

in this instance is a straight line at the top and bottom of the figure.[23]

A drawing of figures is reproduced in Appendix II.

The Instructions to the examinee are: "Here are some figures for you to copy. Just copy them as you see them."[24] The examiner should discourage rotation of test cards by replacing the card in its original position when such turning occurs. Nevertheless, if rotation persist, it is best to let the subject do it his way; attempts on part of the subject to turn the sheet on which he is copying should also be stopped if possible. Bender notes that it is well to encourage placing of the first figure near the upper left-hand corner of the paper although, if the suggestion is not readily accepted, it should not be insisted upon.[25] Hutt, Pascal, Billingslea and other examiners found some value in allowing their subjects complete freedom in their placement, since this gives the examiner insight into the way he "orients himself in a given frame of reference, and into the way he handles spatial relationships."[26]

The subject is also told that he will be presented, one at a time,

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[23] Ibid

[24] Hutt, Max L., "A Tentative Guide for the Administration and Interpretation of the Bender-Gestalt Test." U. S. Army: Adjutant General'sSchool, 1945.

[25] Bender, Lauretta, "Psychological Principles of the Visual Motor Gestalt Test." New York Academy of Science, 11: 164-170, 1949.

[26] Billingslea, F. Y., "The Bender Gestalt Test: An Objective Scoring Method and Validating Data," Journal of Clinical Psychology, 4: 1-28, 1948.

with nine cards with simple designs on them. He is to copy these designs as well as he can on the sheet of unlined paper lying before him. He is permitted to erase whenever he wishes, but no ruler or other drawing aids are permitted. Some subjects ask innumerable questions about where they should begin, whether the number of dots in their drawing must be identical with those on the design, and so on. The examiner's answer should be, as on other projective tests, "That is up to you, do as you like," etc. A few sheets of paper are placed on the table, so that the subject may take another or more sheets if he cannot get all the figures on one sheet. The cards are presented in definite order, beginning with figure A, then figure 1, 2, and so on, to finish with figure 8.

Observing visual motor activity in children from the maturation aspect, Bender found that the child's first attempts consisted solely of scribbling. This only represents pleasure in more play and hardly anything else. In the child the percepts are not organized as they are in the older child and the adult. When visual motor patterns develop, they are "...organized about the primitive enclosed loop."[27] This 'enclosed loop' is the simplest visual motor gestalt relationship. Other relationships, Bender thinks, that require more control are developed later.

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[27] Bender, Lauretta, "A Visual Motor Gestalt Test and Its Clinical Use." Research Monograph No. 3. New York: American Orthopsychiatric Association, 1938.

Bender's investigations show that until about the age of four the child uses the first experienced form, namely the enclosed loop; and this, in several elaborations, contitute his response to any of the figures. In this connection, Bender says:

> The more primitive sensori-motor patterns are dependent on the principles of constant motion, which seems to be largely a whirling movement in a vortex in clockwise and counter-clockwise direction, with an associated radiating directional component and with a tendency to emphasize horizontal planes. Fixed points are difficult to obtain, and straight lines are not accomplished as the shortest distance between two fixed points, but as an expression of the radiating tendencies.[28]

She has also suggested that in the schizophrenic child a spontaneous whirling around a longitudinal axis beyond the age in which such a pattern is appropriate is frequently found. Such representation of a fluid whirling around a longitudinal axis is so common as to be regarded as almost a specific for diagnosis.

These facts in the development of visual motor reactions are stressed because without them test performance cannot be evaluated.

Deviations in the integration of the personality reveal themselves in test reproductions in several ways. These perturbations may vary from mild uncertainty regarding the adequacy of the performance, — to clear evidence of serious regression and personality disturbance.

The more pronounced the disclosure of serious disorder, the more clearly can they be recognized and diagnosed. In this category are

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[28] Ibid

included fragmentation of the designs, and even complete destruction of the gestalten, rotation, elaboration, treatment of the material as if it had concrete significance, definite motor difficulties, and primitivization and over-simplification of the patterns.

Subjects. The Bender Visual Motor Gestalt Test was administered: (1) once to 50 normal subjects consisting of male and female students between the ages of 19 and 46 years, (2) once to 50 psychiatric patients from the John Sealy Hospital in Galveston, Texas, (3) twice to 30 psychiatric patients from the New York State Neuropsychiatric Hospital. The diagnoses for the psychiatric population included psychoneurosis and schizophrenia of various subcategories. There was no effort made to differentiate within the mental hospital population in this study. (4) And once to 15 deteriorated organic patients from the John Sealy Hospital. Fifteen lobotomy pa tients received this test both before and after the operation while 15 lobotomy control patients, who were not operated on, were also given the test twice.

A summary of these groups is presented in Table I.

TABLE I

AGE AND SEX DISTRIBUTION
FOR THE POPULATION
USED IN THIS STUDY

Groups	N	Sex		Mean Age	Age Range
		Male	Female		
Normal Group	50	22	28	28	19-46
Psychiatric Group I	50	19	31	36	13-51
Psychiatric Group II	30	18	12	29	19-52
Lobotomy Group	15	4	11	47	22-57
Lobotomy Control Group	15	2	13	49	34-58
Organic Group	15	14	1	38	17-52

An examination of Table I reveals that the range of the mean age of the sample goes from 28 to 49, and the range goes from 13 to 62. It appears that the normal group is the youngest and that the lobotomy control group is the oldest. There are 77 men in the group and 96 women. From the table, it can be seen that these factors were not controled.

Scoring technique. Pascal's system[29] was used because of this quantitative scoring method, and because it is easy to use. In his scoring system design A of the instrument is not scored except for page placement. The remaining eight designs and the total record are inspected for the possible presence of 105 differentially weighted scorable items. Such items are defined by adequate titles. The results are

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[29] Pascal, Gerald R., and Suttell, B. J., The Bender Gestalt Test Quantification and Validity for Adults, Grune & Stratton, New York, 1951.

recorded on a simplified score sheet (see Appendix II). Total raw scores are themselves totalled, and the final sum then converted from given tables to a standard score, depending upon education level of the subject, high school or college. Pascal suggests that those subjects with low scoring records have greater ego strength than those with high scoring records. Ego strength is considered as one factor making for successful coping with the problems of living in our society.

CHAPTER IV

RESULTS

The results reported here are given primarily in terms of differences between the various groups in their scorable answers on the Bender Visual Motor Gestalt Test, using Pascal's method of scoring. The groups came from a normal population and from mental hospital populations with a psychiatric or organic diagnoses. The assumption made is that differences may be accounted for on the basis of this distinction. Before proceeding to a consideration of these differences it was necessary to examine the reliability of Pascal's scoring method. The first and second testing of thirty patients, both raw and Z scores were correlated. These correlations are shown in Table II.

Reliability of Scoring System

TABLE II

CORRELATION BETWEEN FIRST AND SECOND TESTING OF THE RAW SCORES AND Z SCORES OF MENTAL HOSPITAL GROUP II (N = 30)

Scores	Mean First Testing	Mean Second Testing	Correlation
Raw Scores	65.9	63.1	.84
Z Scores	108.0	99.2	.88

Table II reveals that the Means of the Raw scores of the first and second testing have a difference of 2.8, which is very small considering that the population tested was composed of mental hospital patients.

The Means of the Z scores (the Z scores are found in Pascal's book[30] on Table II, page 100) differ by 8.8 points.

The Pearsonian correlation of the Raw scores was found to be .84, and the correlation of the Z scores was .88, (reliability limited to sample used), which shows a remarkably high reliability for a mental hospital population. If the coefficient of correlation for a population of 30 exceeds .361 it is significant at the 5% level, and if it exceeds .463 it is significant at the 1% level.[31] Thus, the correlation found in this study could be considered high.

The problem of the reliability of a test which pretends to be a measure of something which is correlated with whether a person is a psychiatric patient or not is indeed a difficult one. The problem depends on what variables are being measured. Billingslea,[32] in his objective approach to measure the Bender Visual Motor Gestalt performance found little test reliability. The aspects of performance have to do with whether or not the subject reproduces the essential Gestalt (e.g., makes twelve dots

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[30] Pascal, G. R., and Suttell, B. J., The Bender-Gestalt Test, Quantification and Validity for Adults, Grune & Stratton, New York, 1951.

[31] Lundquist, E. F., "Statistical Analysis in Educational Research," New York: Houghton Mifflin Company, 1940, Page 212.

[32] Billingslea, F. Y., "The Bender Gestalt: An Objective Scoring Method and Validating Data," Journal of Clinical Psychology, Monograph 1, 1948.

for design 1, produces a continuous circle and a square placed on its vertex, for design A, etc.). If we measure the aspects of performance the Test-Retest reliability is almost perfect as found in this study.

In regards to this matter Pascall[33] states the following:

> The Bender Gestalt test seems to be measuring some aspect behavior which is related to the dichotomy, psychiatric patient vs. nonpatient, which we assume to be a continuum. That there is intra-individual variation on this continuum is obvious; psychiatric patients were not always thus. Various experiences can affect a given person's position, family strife—in fact, all the things which made for psychiatric illness. Scored performance, then, is affected by experiences, which may intervene between test and retest...

Pascal found that, as a rule, subjects who score low on the test tend to give the same performance (same score) on successive testing, and that the test-retest reliability is higher for nonpatients than it is for patients. The correlations presented here are for a patient population (high scores) and so the reliability figures are considered very good.

These subjects were given the test twice with an interval of one month elapsing between tests.

It is expected, of course, that the test-retest reliability decreases with an increasing time interval between the two tests. Pascal reports, for example, that in 13 months interval between test and retest of 23 normals he obtained a reliability coefficient of .63.

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[33] Pascal, G. R., and Suttall, B. J., The Bender Gestalt Test, Quantification and Validity for Adults, Grune & Stratton, New York, 1951.

The first test of validity involved the groups of 50 normals, as compared with groups of 50 psychiatric patients. In the patient group the disorders were psychogenic origin; that is, in this group we did not have cases with known damage to cortical tissue.

A comparison of the scores of these two groups are given in Table III.

TABLE III

MEAN SCORES STANDARD DEVIATIONS
AND CRITICAL RATIOS BETWEEN A NORMAL AND PSYCHIATRIC GROUP

Groups	N	Raw Scores Mean	S. D.	"t" ratio	Z Scores Mean	S. D.	"t" ratio
Normal Group	50	15.0	9.3	5.9*	53.0	10.2	7.5*
Psychiatric Group	50	39.0	13.7		72.0	14.6	

*Significant at the 1% level of confidence.

With the patient group of 50 subjects we obtained a mean of 39.0 for Raw scores and 72.0 for Z scores and with the 50 nonpatient subjects we obtained means of 15.0 and 53.0 for Raw scores and Z scores respectively. The scores obtained show a significant difference between the records of patients and "normal" individuals.

For the test of validity a comparison was made between 15 lobotomy control patients who were given the test twice, 15 lobotomy patients who were tested before and after operation, and 15 deteriorated organic patients. The mean scores and standard deviations are shown in Table IV.

TABLE IV

MEAN SCORES, STANDARD DEVIATIONS, AND "t" RATIO OF THE LOBOTOMY CONTROL, LOBOTOMY AND DETERIORATED ORGANIC GROUPS

Groups	N	Mean	"t"	S. D.
Lobotomy Group	15			
Preoperative Test		61.9	7.96*	32.80
Post operative Test		66.2		36.26
Lobotomy Control Group	15			
First Test		74.5	0.06**	33.07
Second Test		74.3		33.68
Deteriorated Organic Group	15	61.1		22.18

*Significant beyond 1% level of confidence.
**Not significant.

Table IV reveals that the deteriorated organic group scored higher than the pre-lobotomy control, post-lobotomy control, pre-lobotomy and post-lobotomy groups. It also gives the data on these matched groups.

An analysis of variance technique was used to determine the significance of the differences among the normal, psychiatric, post-lobotomy and deteriorated organic groups. These results are shown in Table V.

TABLE V

F RATIO ON COMPARING AMONG NORMAL, PSYCHIATRIC, POST-LOBOTOMY AND DETERIORATED ORGANIC GROUPS

Groups	N	M	S. D.
Normal	50	15.0	9.3
Psychiatric	50	39.0	13.7
Post-lobotomy	15	66.0	32.80
Deteriorated Organic	15	61.1	22.18

Analysis of Variance

Source of Variation	SS	d.f.	V	F
Between Groups	65,631.7	3	21,877.23	67.8*
Within Groups	40,644.2	126	322.57	
Total	106,275.9	129		

*Significant beyond 1% level of confidence.

Table V gives the essential data on the experimental population and shows the result obtained with an analysis of variance. It will be noted that the test scores show a significant difference between the groups (F equals 67.8). The mean score for the normal group is 15.0, for the psychiatric group, 39.0, for the post-lobotomy group, 66.0, and for the deteriorated organic group, 61.1.

The obtained value of F, 67.80, greatly exceeds the 1 per cent point , 3.91, and we may reject the null hypothesis with a great deal of confidence. Consequently, we may infer that the differences in scores between the four groups scored, following Pascal's scoring technique, are indicative of real difference, and not the result of chance.

CHAPTER V

SUMMARY AND CONCLUSIONS

This study involved an investigation of the Bender Visual Motor Gestalt Test on known groups, utilizing Pascal's scoring technique. The samples upon which this investigation was made consisted of a total of 175 subjects, 77 men and 96 women, the ages ranging from 13 to 62 years. Fifty of these subjects were "normal" individuals, who were given the test once. Fifty were psychiatric patients from the John Sealy Hospital, who also received the test once. Thirty were psychiatric patients who were administered the test twice, with a range of diagnoses from psychoneurosis to schizophrenic. Fifteen deteriorated organic patients were also tested once. Fifteen lobotomy patients received this test before and after operation, and 15 lobotomy control patients were given the test twice.

This study was concerned with an evaluation of the reliability and validity of the Bender Visual Motor Gestalt Test in differentiating a "normal" group from mental hospital patients.

The Bender Visual Motor Gestalt Test was administered to each of the above mentioned groups. The scoring system used was a quantitative one devised by G. R. Pascal. Reliability of the scoring system was found by correlating the first and second testing of 30 psychiatric subjects. The coefficient of reliability obtained was .84 for the raw scores and .88 for the Z scores.

The validity was tested by applying analysis of variance and F ratios for significance between the experimental groups.

The findings and major conclusions are briefly summarized below. The conclusions are applicable only to the samples used in this study and no generalizations can be made for the entire population.

Differences between Groups Records

Normal groups and psychiatric groups. The psychiatric group records scored higher in the Bender Visual Motor Gestalt Test than the normal group. No other differences were evident.

Pre-control and Post-control groups. The test does not differentiate between a Pre-control and a Post-control group.

Pre-lobotomy and Post-lobotomy groups. The Pre-lobotomy and Post-lobotomy groups scored high, but no significance of importance was evident. This indicates that the test does not differentiate between Pre-lobotomy and Post-lobotomy groups.

Pre-lobotomy and Pre-control groups. No significant difference was found between the Pre-lobotomy and Pre-control groups. This indicates that the Bender Visual Motor Gestalt Test does not differentiate between Pre-lobotomy and Pre-control groups.

Post-lobotomy and Post-control groups. The test does not differentiate between these two groups.

Pre-lobotomy and deteriorated organic groups. The Organic group scored higher than the Pre-lobotomy group. This indicates that the test differentiates between the Pre-lobotomy and deteriorated organic groups.

Post-lobotomy and deteriorated organic groups. The organic group scored higher than the Post-lobotomy group, indicating that the Bender Visual Motor Gestalt Test differentiates between these two groups.

Pre-control and deteriorated organic groups. The deteriorated organic group scored higher than the pre-control group. This indicates that the test differentiates between the Pre-control and deteriorated organic groups.

Post-control and deteriorated organic groups. The findings are again in agreement with previous groups investigated when we tried to differentiate deteriorated organic and other psychiatric groups. The deteriorated groups scored higher than the Post-control group, indicating that the Bender Visual Motor Gestalt Test differentiates between the Post-control and deteriorated organic groups.

One of the major conclusions which can be drawn from this study is the fact that the Bender Visual Motor Gestalt Test, when scored following Pascal's quantitative system, differentiates between patient and nonpatient groups. Patient groups scored higher than nonpatient groups. The investigator agrees with Pascal's statement that "high scores are indicative of little ego strength."[34]

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[34] Pascal, Gerald R., and Suttell, B. J., The Bender-Gestalt Test, Quantification and Validity for Adults, Grune & Stratton, New York, 1951.

Another major conclusion which can be drawn from this study is that the test differentiates among normal, psychiatric, post-lobotomy and deteriorated organic groups.

Another important aspect of this study is the fact that there was found a high correlation testing and retesting a patient group, but it should be stated again that in reporting the data on reliability, this study is limited to the experimental samples used in this test, and that it is not felt that it has been found an accurate estimation of the reliability of the Pascal's scoring technique of the Bender Visual Motor Gestalt Test.

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APPENDICES

APPENDIX I

CHART I

RAW SCORES AND Z SCORES OF NORMAL POPULATION

Patients (By Numbers)	Age	Raw Score	Z Score
1.	24	2	38
2.	32	17	54
3.	28	13	50
4.	26	16	53
5.	27	6	42
6.	25	26	64
7.	29	11	48
8.	22	17	54
9.	26	4	40
10.	21	10	47
11.	20	6	42
12.	24	12	49
13.	29	9	46
14.	31	14	51
15.	28	25	63
16.	32	17	54
17.	31	13	50
18.	28	10	47
19.	22	11	48
20.	23	12	49
21.	27	20	58
22.	26	26	64
23.	36	25	63
24.	38	14	51
25.	35	7	43
26.	28	5	41
27.	23	26	64
28.	22	2	38
29.	24	4	40
30.	32	32	71
31.	28	17	54
32.	26	17	54
33.	41	6	42
34.	28	18	55
35.	25	33	72
36.	32	2	38
37.	24	24	62
38.	22	19	56
39.	20	36	75
40.	19	10	47
41.	24	15	52
42.	28	2	38
43.	32	12	49
44.	30	33	72
45.	46	37	76
46.	28	24	62
47.	24	13	54
48.	29	13	54
49.	34	4	40
50.	26	18	55
N = 50			
X		765	2629
M	27.7	15.3	52.6

CHART II

RAW SCORES AND STANDARD DEVIATIONS
ON THE SCORING OF THE NORMAL POPULATION

Students (By Numbers)	Raw Score	x	x^2
1.	2	-13	169
2.	17	2	4
3.	13	-2	4
4.	16	1	1
5.	6	-9	81
6.	26	11	121
7.	11	-4	16
8.	17	2	4
9.	4	-11	121
10.	10	-5	25
11.	6	-9	81
12.	12	-3	9
13.	9	-6	36
14.	14	-1	1
15.	25	10	100
16.	17	2	4
17.	13	-2	4
18.	10	-5	25
19.	11	-4	16
20.	12	-3	9
21.	20	5	25
22.	26	11	121
23.	25	10	100
24.	14	-1	1
25.	7	-8	64
26.	5	-10	100
27.	26	11	121
28.	2	-13	169
29.	4	-11	121
30.	32	17	289
31.	17	2	4
32.	17	2	4
33.	6	-9	81
34.	18	3	9
35.	33	18	324
36.	2	-13	169
37.	24	9	81
38.	19	4	16
39.	36	21	441
40.	10	-5	25
41.	15	0	0
42.	2	-13	169
43.	12	-3	9
44.	33	18	324
45.	37	22	484
46.	24	9	81
47.	13	-2	4
48.	13	-2	4
49.	4	-11	121
50.	18	3	9
N = 50			
x^2			4301
$x^2/N = 86.02$			
S. D. = 9.27			

CHART III

Z SCORES OF THE NORMAL POPULATION

Students (By Numbers)	X	x	x^2
1.	38	-15	225
2.	54	1	1
3.	50	-3	9
4.	53	0	0
5.	42	-11	121
6.	64	11	121
7.	48	-5	25
8.	54	1	1
9.	40	-13	169
10.	47	-6	36
11.	42	-11	121
12.	49	-4	16
13.	46	-7	49
14.	51	-2	4
15.	63	10	100
16.	54	1	1
17.	50	-3	9
18.	47	-6	36
19.	48	-5	25
20.	49	-4	16
21.	58	5	25
22.	64	11	121
23.	63	10	100
24.	51	-2	4
25.	43	-10	100
26.	41	-12	144
27.	64	11	121
28.	38	-15	225
29.	40	-13	169
30.	71	18	324
31.	54	1	1
32.	54	1	1
33.	42	-11	121
34.	55	2	4
35.	72	19	361
36.	38	-15	225
37.	62	9	81
38.	56	3	9
39.	75	22	484
40.	47	-6	36
41.	52	-1	1
42.	38	-15	225
43.	49	-4	16
44.	72	19	361
45.	76	23	529
46.	62	9	81
47.	54	1	1
48.	54	1	1

CHART III

Z SCORES OF THE NORMAL POPULATION
(Continued)

Students (By Numbers)	X	x	x^2
49.	40	-13	169
50.	55	2	4
N = 50			
X			
x^2			5129
N = 53.0			
x^2/N = 102.6			
S. D. 10.12			

CHART IV

RAW SCORES AND Z SCORES OF GROUP I
MENTAL HOSPITAL PATIENTS

Patients (By Numbers)	Age	RAW SCORES X	RAW SCORES x	RAW SCORES x^2	Z SCORES X	Z SCORES x	Z SCORES x^2
1.	41	39	0	0	72	0	0
2.	31	45	6	36	79	7	49
3.	41	18	21	441	50	22	484
4.	43	54	15	225	88	16	256
5.	32	19	20	400	51	21	441
6.	36	42	3	9	75	3	9
7.	16	47	8	64	81	9	81
8.	46	43	4	16	77	5	25
9.	32	31	8	64	64	8	64
10.	21	26	13	169	59	13	169
11.	13	25	14	196	57	15	225
12.	41	17	22	484	49	23	529
13.	49	39	0	0	72	0	0
14.	45	45	6	36	79	7	49
15.	30	14	25	625	43	29	841
16.	15	47	8	64	81	9	81
17.	36	33	6	36	66	6	36
18.	50	29	10	100	62	10	100
19.	52	57	18	324	91	19	361
20.	40	29	10	100	62	10	100
21.	51	69	30	900	104	32	1024
22.	49	27	8	64	81	9	81
23.	24	39	0	0	72	0	0
24.	26	49	10	100	83	11	121
25.	31	58	19	361	92	20	400
26.	31	31	8	64	64	8	64
27.	13	39	0	0	72	0	0
28.	50	61	22	484	96	24	576
29.	25	48	9	81	82	10	100
30.	36	31	8	64	64	8	64
31.	15	46	7	49	80	8	64
32.	26	28	11	121	61	11	121
33.	22	23	16	256	55	17	289
34.	19	36	3	9	69	3	9
35.	40	59	20	400	93	21	441
36.	58	47	8	64	81	9	81
37.	50	41	2	4	74	2	4
38.	47	60	21	441	95	23	529
39.	37	67	28	784	102	30	900
40.	32	37	2	4	70	2	4
41.	32	54	15	225	88	16	256
42.	58	42	3	9	75	3	9
43.	57	39	0	0	72	0	0
44.	36	23	16	256	55	17	289
45.	49	38	1	1	71	1	1
46.	22	20	19	361	52	20	400
47.	32	31	8	64	64	8	64
48.	26	17	22	484	49	23	529

CHART IV

RAW SCORES AND Z SCORES OF GROUP I
MENTAL HOSPITAL PATIENTS
(Continued)

Patients (By Numbers)	Age	RAW SCORES X	RAW SCORES x	RAW SCORES x^2	Z SCORES X	Z SCORES x	Z SCORES x^2
49.	38	21	18	324	53	19	361
50.	39	42	3	9	75	3	9
N = 50							
Totals	1811	1942		9382	3602		10690
x^2/N				187.64	213.80		
M	36.2	38.8			72.0		
S. D.	13.69				14.62		

CHART V

RELIABILITY OF INSTRUMENT
RAW SCORES AND Z SCORES OF GROUP II MENTAL HOSPITAL PATIENTS

Patients (By Numbers)	Age	RAW SCORES 1st Testing (X)	RAW SCORES 2nd Testing (Y)	Z SCORES 1st Testing (X)	Z SCORES 2nd Testing (Y)
1.	43	71	80	106	116
2.	36	87	91	123	127
3.	32	39	33	72	76
4.	38	53	60	87	95
5.	24	18	14	50	46
6.	19	79	76	115	111
7.	28	157	150	197	190
8.	27	29	25	62	57
9.	25	39	49	72	83
10.	19	76	69	111	104
11.	27	62	71	97	106
12.	30	35	30	68	63
13.	25	74	61	109	96
14.	22	31	29	64	62
15.	35	60	79	95	115
16.	27	87	66	123	101
17.	28	28	30	61	63
18.	23	97	86	134	122
19.	21	29	30	62	63
20.	25	18	11	50	43
21.	32	52	106	86	143
22.	36	71	68	106	103
23.	24	118	97	156	134
24.	28	75	60	110	95
25.	46	92	89	128	125
26.	18	104	106	141	143
27.	52	67	71	102	106
28.	27	66	65	101	100
29.	29	128	57	167	21
30.	22	36	33	69	66
N = 30					
ΣX		1978	1892	3024	2977
ΣXY		150376			9002448
ΣX^2		163424			487348
ΣY^2		147676			514303
$(\Sigma X)^2$		3912484			9144576
$(\Sigma Y)^2$		3579664			8862529

$$r = \frac{XY - \frac{\Sigma X \Sigma Y}{N}}{\sqrt{\left(X^2 - \frac{(\Sigma X)^2}{N}\right)\left(Y^2 - \frac{(\Sigma Y)^2}{N}\right)}}$$

r	.84	.88

$$t = \frac{r}{\sqrt{1 - r^2}} \left(\sqrt{N - 2}\right)$$

t	8.202 (highly significant for 28 degrees of freedom)	9.79 (highly significant for 28 degrees of freedom)

CHART VI

RAW SCORES OF THE TESTING
AND RE-TESTING LOBOTOMY CONTROL GROUP

Patients (By Numbers)	Age	1st Testing (X)	x	x^2	2nd Testing (X_1)	x_1	x_1^2
1.	51	87	12	144	66	8	64
2.	55	28	47	2209	30	44	1936
3.	48	97	22	484	106	32	1024
4.	49	29	46	2116	60	14	196
5.	49	18	57	3249	11	61	3721
6.	58	102	27	729	106	42	1764
7.	57	71	4	16	68	6	36
8.	55	118	43	1849	107	33	1089
9.	51	75	0	0	60	14	196
10.	49	92	17	289	89	15	225
11.	48	104	29	841	106	32	1024
12.	42	67	8	64	71	3	9
13.	58	66	9	81	65	9	81
14.	54	128	53	2809	137	63	3969
15.	37	36	39	1521	33	41	1681
N = 15							
X		1118			1115		
X^2				16401			17015
M		74.5			74.3		
M^2		5550.25			5520.49		
X^2/N				1093.40			1134.33
S. D.		33.07					33.68

CHART VII

RAW SCORES OF THE TESTING OF
THE PRE AND POST
LOBOTOMY GROUP

Patients (By Numbers)	Age	Pre-lobotomy X	Pre-lobotomy x	Pre-lobotomy x^2	Post-lobotomy X	Post-lobotomy x	Post-lobotomy x^2
1.	43	80	18	324	72	6	36
2.	49	87	15	225	66	0	0
3.	51	39	23	529	22	44	1936
4.	47	53	9	81	20	46	2116
5.	23	18	44	1936	13	53	2809
6.	51	79	17	289	81	15	225
7.	51	157	95	9025	155	25	625
8.	51	29	33	1089	41	89	7921
9.	53	39	23	529	87	21	441
10.	51	76	14	196	54	12	144
11.	49	71	9	81	46	20	400
12.	49	35	27	729	110	44	1936
13.	57	74	12	144	93	27	729
14.	52	31	31	961	81	15	225
15.	22	60	2	4	52	14	196
N = 15							
X		928			993		
X^2		73954			85475		
$(X)^2$		861184			989649		
x^2				16142			19739
M	46.9	61.9			66.2		
x^2/N				1076.13			1315.93
S. D.				32.80			36.26

CHART VIII

RAW SCORES AND STANDARD DEVIATION OF THE DETERIORATED ORGANIC GROUP

Patients (By Numbers)	Age	Raw Scores (X)	x	x^2
1.	62	77	4	16
2.	17	88	7	49
3.	57	95	14	196
4.	35	80	1	1
5.	45	66	15	225
6.	30	72	9	81
7.	44	76	5	25
8.	19	68	13	169
9.	34	91	10	100
10.	22	66	15	225
11.	18	146	65	4225
12.	61	55	26	676
13.	32	90	9	81
14.	33	49	32	1024
15.	60	98	17	289
N = 15				
X		1217		
x^2				7382
x^2/N				492.13
M		81.1		
Mean age	37.9			
S. D.		22.18		

CHART IX

A SUMMARY OF MEANS,
STANDARD DEVIATIONS, VARIANCES
FOR ALL GROUPS

Groups	M	S. D.	$\frac{x^2}{N}$
Normal = (N = 50)			
Ray Scores	15.3	9.27	86.06
Z Scores	52.6	10.12	102.6
Mental Hospital Patients Group I (N = 50)			
Raw Scores	38.8	13.69	187.64
Z Scores	72.0	14.62	213.80
Mental Hospital Patients Group II (N = 30)			
Raw Scores	65.93		
Z Scores	100.8		
Pre-lobotomy Control (N = 15)			
Raw Scores	74.5	33.07	1093.40
Post-lobotomy Control (N = 15)			
Raw Scores	74.3	33.68	1134.33
Pre-lobotomy (N = 15)			
Raw Scores	61.9	32.80	1076.13

CHART IX

A SUMMARY OF MEANS,
STANDARD DEVIATIONS, VARIANCES
FOR ALL GROUPS
(Continued)

Groups	M	S. D.	$\frac{x^2}{N}$
Post-lobotomy			
Raw Scores	66.2	36.26	1315.93
Deteriorated Organic			
Raw Scores	81.1	22.18	492.13

APPENDIX II

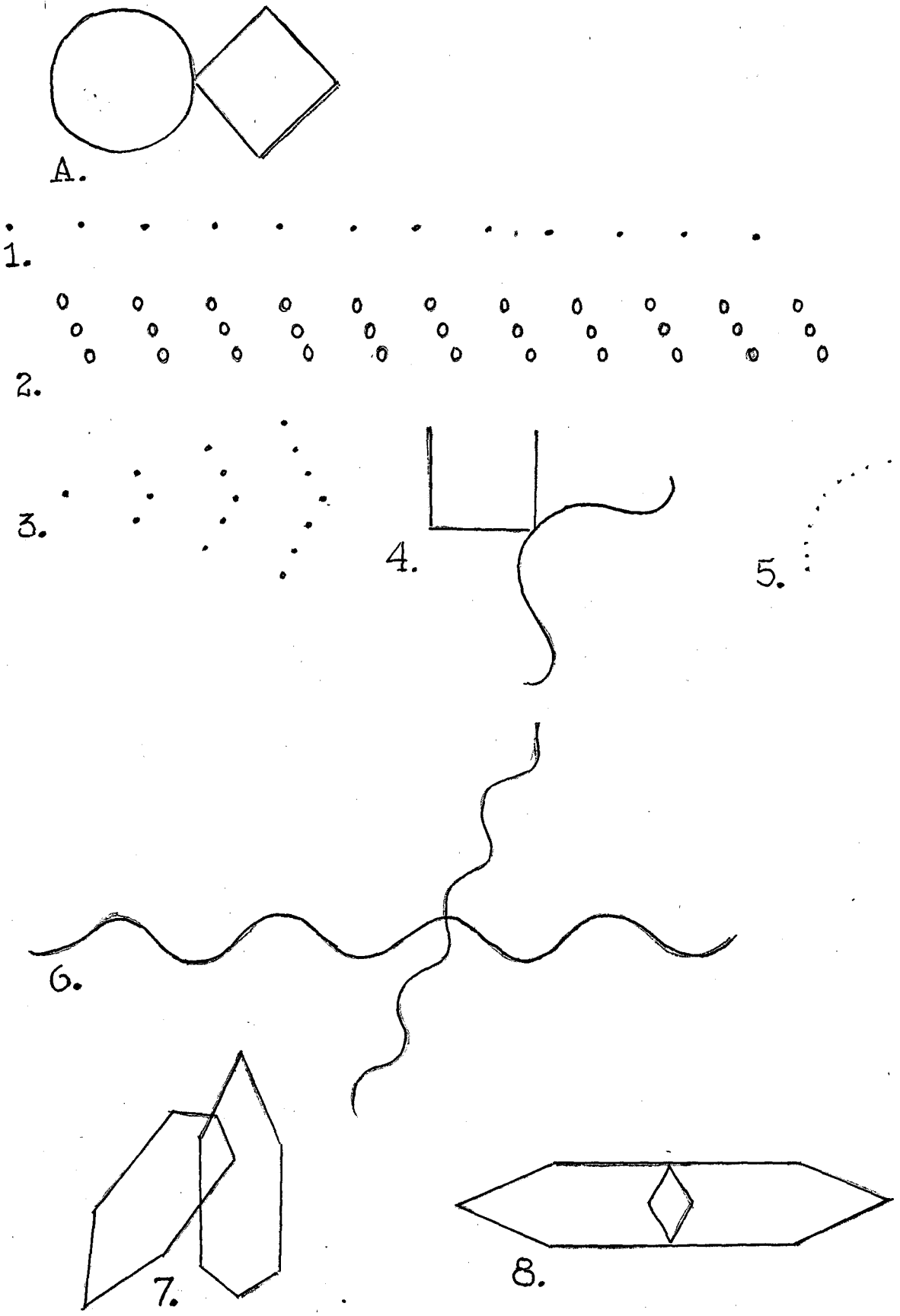

PLATE 1. TEST FIGURES ADAPTED FROM WERTHEIMER

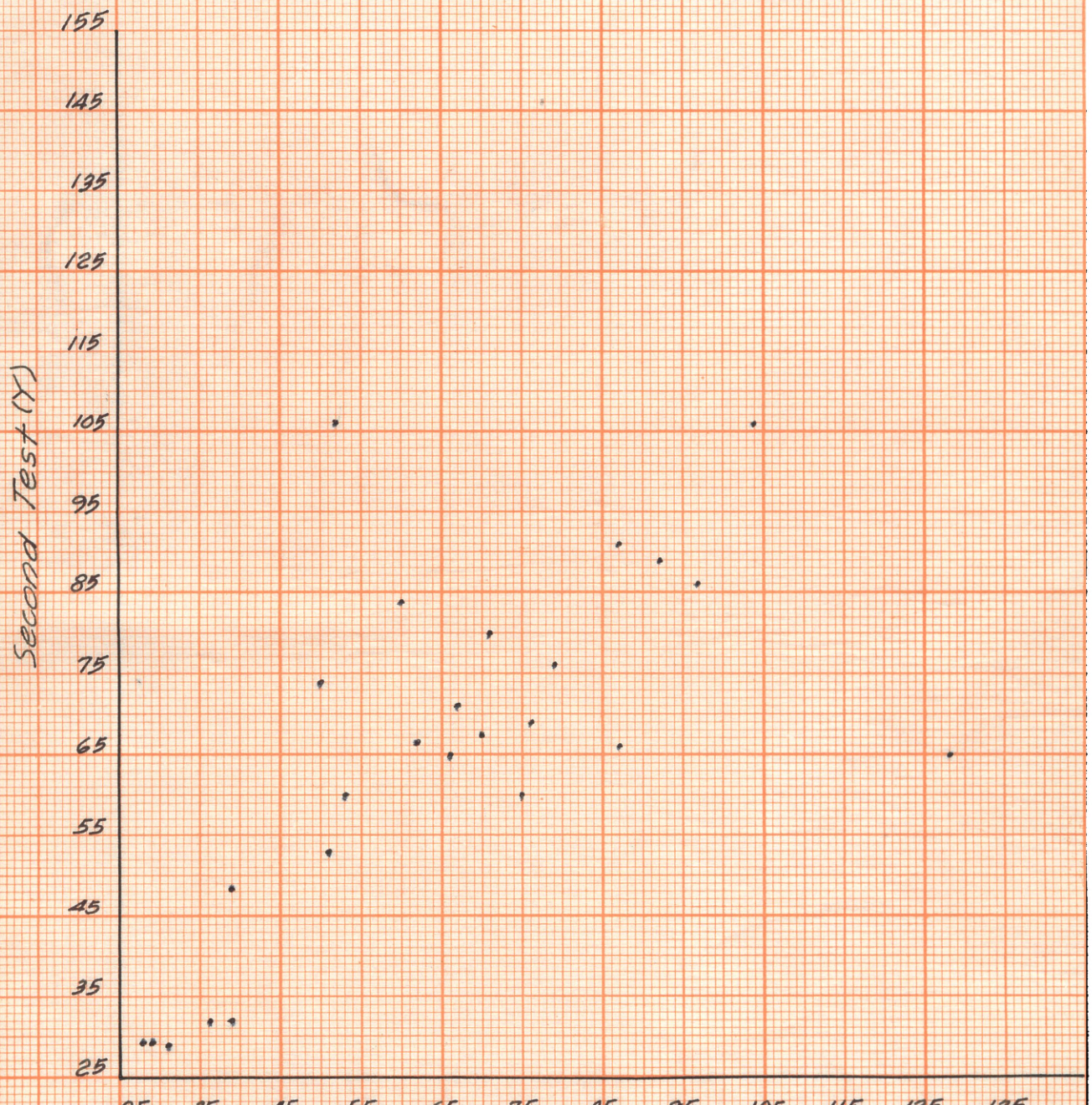

FIGURE 1.- Correlation chart for Raw Scores on First Test and Second Test given in Chart V
Correlation coefficient equal to .84