THE UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

A STUDY OF FACTORS INVOLVED IN THE REPRODUCTION OF BENDER DESIGNS IN NORMAL AND SCHIZOPHRENIC SUBJECTS

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A STUDY OF FACTORS INVOLVED IN THE REPRODUCTION OF BENDER DESIGNS IN NORMAL AND SCHIZOPHRENIC SUBJECTS

CHAPTER I

INTRODUCTION AND PROBLEM

The causes and nature of mental disorder have long been a perplexing problem for students of human behavior. There have been many speculations and much theorizing about the fundamental nature, processes, and treatment of mental disorders. It is far too soon in our state of knowledge to make pronouncements concerning the correctness or incorrectness of most of the tenets, principles, beliefs, and practices.

When a clinician devises a diagnostic instrument, he must, of necessity, have in mind some fairly systematic beliefs about the particular functions or processes about which the instrument is designed to give him information. For example, the diagnostician who devises a scale which will rank individuals on a masculinity-femininity continuum must have a relatively clear notion of what masculinity-

femininity means and the importance of the degree of masculinity or femininity on the behavior of the individual. Or, if the clinician designs a test which attempts to assess the degree of hostility and to determine whether that hostility is directed inward or outward, he must consider hostility and the way in which an individual handles it to be of very real importance as a determiner of behavior.

The constructor of a diagnostic test, therefore, must have in mind a fairly clear theoretical frame of reference from which to operate. Though we have no real answer to the nature of personality growth and development, the test constructor must function as though he did have this knowledge. His aim is to construct an instrument so that other diagnosticians who use it can in a few hours learn about an individual those things which are necessary in order to make both a diagnosis and a prognosis.

In other words, the test constructor is designing an instrument which presumes to determine what he considers most important to know about an individual.

In constructing explanations of disease processes, the theoretician is in much the same position. He too must have in mind fairly systematic beliefs with which he can relate the particular functions or processes which are of interest to him. Let us examine briefly some of the thinking about schizophrenia and some of the general theories which have been presented.

For at least a century, the causes, nature, and processes of mental disorder have been observed and studied intensively. Since the middle of the nineteenth century, then, serious thought has been given to a greater scientific understanding of the mental disorder known as schizophrenia. But even today Noyes admits that while schizophrenia is "one of the commonest of serious mental disorders its essential nature is probably least understood" (32, p. 358). The result is that the present explanations of schizophrenic behavior depend upon the theoretical school to which one subscribes. For example, in discussing this confusing state of affairs, Dorcus and Shaffer write:

> Some investigators have claimed schizophrenia represents a regression to the level of a child or of a primitive man. The psychoanalytic group has given a prominent position to regression. . . . The point of view . . . taken by Adolph Meyer [is] that schizophrenia is the result of the failure of an individual to make an adequate adjustment to his environment. It is the end result of gradually accumulating faulty habit reactions (16, p. 328-329).

The works of Goldstein (19), Kasanin (28), and Vigotsky (38) tend to emphasize the concreteness of the schizophrenic, following the trend of a large number of psychiatric and psychological thinkers to view the schizophrenic process as a deeply regressive one. Arieti states much the same view in an article on the special logic of schizophrenic thought:

> When the pathologic process progresses further, the ideational formations will contain

> more and more concrete elements, representing reality as it appears to the senses rather than to the intellect. Perceptual elements finally eliminate completely higher thought processes. . . . Ideas are represented by sensory images (3, p. 335).

The followers of Meyer, as was mentioned before, are somewhat opposed to the thinking of schizophrenia as a regressive phenomenon. Nevertheless, a common denominator can be seen between the regressive and reactive theories in that they both suggest the involvement of perceptive functioning.

There has been much research in the area of the schizophrenic perceptual process. As has been mentioned, Goldstein (19), Vigotsky (38), Kasanin (28), and Arieti (3) have been concerned with the study of schizophrenic thinking. Cameron (10, 11, 12, 13), too, has contributed much in this area. Reaction time and set have been investigated by Rodnick and Shakow (34), Clausen (14), Knehr (30), and Horany-Heurst (24).

Kraiz (31), in 1936, investigated psychosensory disturbances in some forms of schizophrenia. His major concern was the description of those disturbances. The following list of phenomena, which had previously been observed and described as occurring in organic and toxic disorders, was discussed as occurring in the schizophrenic process: a) perception of stationary objects as in motion, b) changes in perception of size of objects, c) receding of objects placed in front of the eyes, d) changes in perception of spatial

relations, e) changes in perception of the consistency of surrounding objects, f) constricting and apparent splitting up of the field of vision, g) changes in the perception of the color of objects, and h) changes in patients' perceptions of their bodies. The difficulty of localizing such psychosensory phenomena presents problems of considerable importance from the nosological point of view.

In a more experimental approach, Sato studied the form perception of the mentally ill. One series of experiments concerned the drawings of schizophrenics when reproducing an object and copying from a pattern. Sato concluded that it "appears to be justified that it is primitive drawing which the schizophrenic process calls forth" (35, p. 107).

Adler (1) studied normal vs. schizophrenic perception of similarities using a matching technique. Each subject matched a master picture, of which there were eight, with "(a) pictures peripherally but not functionally similar to it, or (c) pictures neither functionally nor peripherally similar to it" (1, p. 507). The results showed that normals chose functionally similar relationships significantly more often than did schizophrenics.

At the present stage in our knowledge, all approaches to diagnosing, studying or explaining mental disorder must be subject to much critical examination. In the past few years a number of testing techniques have been developed to

aid the clinician in making a diagnosis. Included among these techniques are the Rorschach, the Wechsler-Bellevue Intelligence Scale, the Thematic Apperception Test, and The Bender-Gestalt test. Each technique is based upon the system of beliefs held by the clinician who devised it. These beliefs, of necessity, must be formulated into the assumptions which provide the underlying structure of the instrument. Such assumptions are, of course, subject to examination and experimental validation.

One of the instruments which has been widely used in the diagnosis of schizophrenia is the Bender-Gestalt test which was introduced in 1938. In this case as in all others the test constructor has attacked the problem by making assumptions, that is, by starting from definitely stated beliefs about human behavior, particularly as it may relate to the test situation. In the Foreword to Pascal and Suttell's The Bender-Gestalt test, Wright points out that "the responses of each person to a single test situation must be definitely determined, indeed, by the totality of psychic activity at that time" (33, p. v), and Bender herself states:

> The Gestalt function may be defined as that function of the integrated organism whereby it responds to a given constellation of stimuli as a whole, the response itself being a constellation or pattern or gestalt. 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 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 (5, p. 3-4).

Here we have a clear statement that the response involves the whole organism and reveals something of the whole integrative state of the organism. That is to say, the reproduction of the Bender figures is not determined simply by the stimulus figure, but rather is the product of the whole test setting, including the whole integrative state of the individual. It follows then that any reproduction of the stimulus figure will reflect any deviation in the total organism.

Deviations in the response have their foundation in deviations in the total responding organism. But while accepting the assumption that the total responding organism is involved and recognizing that the organism functions as an integrated whole, we may also recognize that the integrated whole is composed of operationally defined elements. Therefore, aberrations in performance may be traceable to deviations in these elements which make up the integrated whole.

Billingslea states:

> The Bender-Gestalt test . . . was built on the premise that accurate visual-motor perceptual behavior is a skillful act. 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 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 (6, p. 1).

Pascal and Suttell follow the same line of reasoning in discussing the assumptions made by Bender and clarify the nature of the elements of the integrated whole:

> 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 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 /Pascal and Suttell reference numbers omitted/ (33, p. 6).

In the above paragraph Pascal and Suttell clearly state that there are three things involved in the copying of the Bender designs: a) the individual's capacity to perceive correctly, b) the individual's capacity to execute the figures, and c) the individual's interpretation of them. In order to copy the designs as normal people do, the individual must perceive, execute, and interpret the designs as normal people do. In the very next paragraph Pascal and Suttell further state, "If we accept as given the ability to perceive and execute the designs, deviant performance should, then, be a function of the interpretative factors which obtrude between perception and execution" (33, p. 6). We can

see from this statement that Pascal and Suttell place the interpretative factors between perception and execution and, further, posit that "deviant performance" is a function of the interpretative factors. In other words, here we have the expressed belief that the abnormal productions of abnormal individuals are traceable to differences from normals in the interpretative factors.

It is also apparent from the quotation above that the term perception has a rather broad meaning for Pascal and Suttell. In limiting the interpretative or ego function in referring to the Bender designs, "what they and the task mean to him in the light of his own experience," everything else is assigned to the perceptual function. That is, in addition to sensation, in perception they included seeing Figure A as a circle and a square, Number 1 as twelve dots in a line, etc.

Again quoting from Pascal and Suttell:

> Prolonged psychological stress often results in a disturbed organism. This disturbance, measured in terms of deviations from normative data, is reflected at several levels of organismic functioning. Hoskins and Gellhorn discuss this subject at the physiological level. More specifically, and representative of studies in this area, Hoagland et al have shown a disturbed lymphocyte reaction in psychotics. At a different level of organismic functioning there is evidence to indicate disturbed reaction time in psychogenic as well as so-called organic disorders. Deviations from the number of popular responses on the Rorschach and Word Association tests are a concomitant of psychological disturbances. Several writers have reported a relationship between Wechsler-Bellevue Scatter

> and severity of psychological disturbances. It seems, therefore, that when the organism is disturbed by psychogenic factors the disturbance can often be measured at various levels of the response mechanism. We shall postulate, however, that where symptoms are predominately psychological, disturbances in cortical functioning tend to be more prominent than disturbances at other, lower levels of functioning /Pascal and Suttell reference numbers omitted/ (33, p. 6).

Here Pascal and Suttell are pointing out that when an individual is psychologically disordered, the disturbance can often be measured at several levels of responding or functioning, ranging from the completely physical through the various aspects of cortical functioning. Pascal and Suttell make the assumption that, in individuals whose symptoms of disorder are predominately psychological, disturbances in cortical functioning tend to predominate over disturbances at the lower levels of responding. It follows then that measurement made at the level where the disturbance is most pronounced will yield larger, and therefore more easily assessable, differences in functioning.

In discussing the paragraph quoted above, Pascal and Suttell refer to a figure prepared by Hunt and Cofer based on data in papers by Huston, Shakow, and Rigs. This figure shows "the differences in milliseconds between the mean times of schizophrenics and controls for reactivity at three levels of complexity." If the baseline of this figure is considered as representing a continuum of increasing complexity of tasks, it is obvious that the difference in re-

sponse time between normal controls and schizophrenics becomes increasingly greater with increasing complexity of the task.

In discussing the relationship between complexity of task and qualitative differences in performance, Pascal and Suttell state:

> We would suggest that execution of the B-G test is a complex task belonging out to the right on the baseline of a theoretical figure 2 in terms of complexity of task. Its position on the baseline, however, would depend on the measures used to estimate the response. Thus, if we are only interested in whether or not the essential Gestalten are reproduced, then the level of complexity of the task is not as high as it would be if finer nuances of execution were taken into consideration. At this relatively low level of complexity, i.e., measurement of whether or not the essential Gestalten are reproduced, the test would, according to our theoretical figure 2, have less discriminating power for psychogenic disorders. This expectation is borne out in actual practice. All of the designs of the test are correctly reproduced, in their essential aspects, by the age of eleven years /Pascal and Suttell reference numbers omitted/ (33, p. 7).

In discussing the effect of cortical damage on the reproduction of the Gestalt designs, Pascal and Suttell state:

> We may think of B-G performance as a work sample, which involves certainly the cortical capacity to perceive the designs as presented and the psychomotor capacity to reproduce them; but it involves also, and most importantly with subjects of normal intelligence, a factor that seems to be best described as an attitude. The test situation for the individual, once he is subjected to it, becomes a bit of reality with which he has to cope. We 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 from brain damage, the greatest number of deviations were found in psychotic subjects, fewer in psychoneurotic subjects, and least in nonpatients (33, p. 8).

Pascal and Suttell conclude the following:

> Thus, measurement at the level of complexity indicated by estimation of whether or not the essential gestalten are reproduced does not seem to be of sufficient discriminating power to distinguish between normal adults and those with psychogenic disorders. Adults of normal intelligence without known cortical damage do not, in our experience, fail to reproduce the essential Gestalten. Deviations from the stimuli in these latter individuals do not seem to be a function of ability to perceive or execute the designs. We believe, therefore, that what is being measured by us in the scoring of the B-G of individuals of normal intelligence is some factor other than the ability to perceive or execute the designs (33, p. 8).

The purpose of the present study, using samples of normals and of schizophrenics, will be to examine the validity of the assumptions made by Pascal and Suttell in assigning differences in execution to interpretative factors and, as a by-product, to accumulate additional data on the validity of the Bender-Gestalt as a diagnostic instrument. It will also contribute additional information about the schizophrenic process. If, in the execution of the designs, the schizophrenics are sharply differentiated from normals, then the validity of the test may be assumed. If it can be demonstrated that tne performances in the perceptual phase

are similar, the Pascal and Suttell assumption assigning differences in execution to the interpretative function would then hold. If, however, the performances in the perceptual phase are dissimilar, then differences in performances of normal and schizophrenic subjects in execution may be traceable to either the perceptual or interpretative phases or a combination of both.

The following hypotheses will be tested:

1. That there is no difference between the motor performance of normals and schizophrenics on the Bender-Gestalt.

2. That there is no difference between the discrimination of schizophrenics and normals in the perceptual phase of the Bender-Gestalt.

CHAPTER II

THE EXPERIMENT

The Subjects

Eighty subjects were used in this study. Fifty-two were hospitalized,[1] diagnosed schizophrenics. The remaining twenty-eight were college students, occupational and recreational therapists, student nurses, hospital attendants, and office workers. The schizophrenic group was composed of twenty-three males and twenty-nine females. The normal group was composed of twelve males and sixteen females who were not hospitalized.

The age range for all subjects was from sixteen to sixty years. All subjects were of at least normal intelligence. No complicating features such as brain damage, epilepsy, paresis, etc., were evident in the diagnoses of the hospitalized subjects.

The schizophrenic group was composed of all variations of that diagnostic category: simple, catatonic, hebe-

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[1]The author is indebted to the staff of the Central State Griffin Memorial Hospital, Norman, Oklahoma, for their selection of subjects for the patient sample used in this study.

phrenic, and paranoid schizophrenics. No attempt was made to match subjects or to control for periods of hospitalization. These subjects had been hospitalized for periods ranging from several months to some thirty years. They were designated as either convalescent patients (confined to unlocked wards) or chronic patients (confined to locked wards).

In the final analysis of the data the schizophrenic subjects were "lumped" together, because an inspection of the various categories, e.g., chronic vs. convalescent, male vs. female, etc., tended to show no differences, and categorization on the basis of age or intellectual level was not practical because of the smallness of the population.

Materials and Procedure

Each subject was presented with all nine designs of the Bender-Gestalt Test, one at a time. The subject was asked to reproduce each of the designs on a separate four by six inch white card. The administration, except for the use of individual cards for reproduction, followed standard Bender-Gestalt procedure. In addition, the subject was informed that the drawing was to familiarize him with some designs he would be examining later.

Each drawing was made with a Scripto pencil using medium lead. The pencil was equipped with an eraser.

On completion of each design the examiner slipped the drawing into a mounting on a large card made of grey

construction paper.

Two series of stimulus cards were used. The designs on the stimulus card for Series 1 consisted of the regular Bender-Gestalt design, a traced replica of the original figure made with the same type of lead as was used in the experimental situation, and the subject's reproduction. The placement of the designs was varied randomly. Series 2 contained a regular Bender-Gestalt card, a traced replica, and two free hand drawings, each with a greater degree of distortion than the traced copy. The order in which the figures were arranged on the stimulus cards of each series was determined by a table of random numbers.

When he had completed the drawings, the subject was told he would be shown designs similar to the ones he had drawn and that he was to select "the <u>two</u> which are <u>most alike</u>." Appropriately each subject was informed whether he was to choose "two out of three" or "two out of four" depending on the series being presented. The order of presentation of the series was staggered, that is, Series 1 was presented first to every other subject, while Series 2 was presented first to the other half. Each selection was recorded simply as the positions chosen, e.g., 1-3, 2-3, 1-4, etc. Spontaneous comments were recorded as well (Appendices A and B).

The stimulus cards of both series were presented in a specially constructed apparatus made of grey pasteboard

1/16" thick, 25" long, and 10" wide into which four windows which were 4" x 6" had been cut. The windows were covered with onion skin paper (Esleeck Fidelity Onion Skin) to obscure erasures and differences in pencil pressures as well as to make impossible differentiation of the ink of the originals and the pencil of the traced copies and the subject's drawings. The windows were spaced 1/4" apart and were reinforced by 1/4" thick wood slats. On the top and bottom the slat was 3/4" wide, while between each window a 1/4" slat was placed.

After completion of the eighteen selections of the "two which are most alike," each subject was asked if he had recognized any of his own drawings among the designs he viewed. In addition, about eighty percent of the schizophrenic subjects described one or more of the designs for the examiner. This request was always posed in the form: "I must describe these designs when I write up this experiment, and frankly, I am having a difficult time trying to tell what this one is like. Could you help me? How would you say it?"

The subjects' reproductions were scored by the Pascal and Suttell (33) system. The examiner's scores correlated about .90 with the criterion scores. As an added check an independent observer scored the tests. A coefficient of correlation of better than .80 was obtained between the scores of the examiner and those of the independent

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observer. A coefficient of correlation of better than .80 was obtained between the scores of the observer and the Pascal and Suttell scoring criterion scores. The resulting scores were then analyzed.

CHAPTER III

RESULTS AND DISCUSSION

The results of this study are presented in Table 1. In column one are listed the subject designates in the form of Arabic numerals. Any reference to subjects will henceforth be in terms of those numerals. The second column is composed of the scores obtained on the reproductions of the Bender-Gestalt stimuli using the Pascal and Suttell (33) scoring system. Column three shows the number of incorrect choices made in the selection of "the two most alike" from Series 1 in which the choice was among three designs, one of which was the subject's own, i.e., a Bender-Gestalt stimulus card, a traced replica, and the subject's own reproduction. The fourth column shows the number of incorrect selections made from Series 2 which was composed of a Bender-Gestalt card, a traced copy, and two free hand reproductions. The subjects are grouped, for convenience, according to sex and diagnosis.

Table 2, which presents the percentage distributions of the scores, reveals that seventy-five percent of the schizophrenic subjects had Bender-Gestalt scores of eighty

Table 1

Bender-Gestalt Scores, Series 1 and Series 2 Error Scores for Total Population

Subj.	Bender Score	Series 1 Errors	Series 2 Errors
Female Schizophrenics			
1	190	1	5
2	133	0	1
3	123	0	0
4	108	0	2
5	106	1	4
6	98	0	3
7	97	1	1
8	93	1	0
9	90	1	0
10	87	1	0
11	87	0	2
12	85	0	0
13	85	0	0
14	84	0	0
15	84	0	1
16	83	1	2
17	83	0	0
18	83	0	1
19	82	0	2
20	82	1	2
21	80	0	1
22	75	0	0
23	74	1	4
24	74	0	3
25	72	0	0
26	72	0	2
27	71	0	0
28	70	0	1
29	56	0	2
Male Non-Hospitalized			
53	67	0	2
54	66	0	0
55	63	0	4
56	60	0	1
57	60	0	0
58	59	0	1
59	57	0	0
60	52	0	2
61	46	0	1
62	45	1	0
63	45	1	2
64	37	1	0
Male Schizophrenics			
30	131	0	3
31	121	0	6
32	111	0	2
33	95	0	1
34	89	1	3
35	89	0	1
36	86	1	2
37	86	0	2
38	85	0	1
39	84	0	1
40	84	0	1
41	84	0	0
42	83	0	1
43	83	0	1
44	82	0	2
45	81	0	0
46	81	0	1
47	80	0	1
48	76	0	3
49	73	1	0
50	64	1	3
51	57	2	2
52	56	1	2
Female Non-Hospitalized			
65	81	0	3
66	80	0	1
67	77	0	1
68	71	0	2
69	66	0	1
70	64	0	1
71	59	0	1
72	59	0	2
73	59	0	3
74	58	0	2
75	56	0	1
76	56	0	1
77	55	0	2
78	53	0	0
79	53	0	3
80	50	0	0

or more while only seven percent of the non-hospitalized group scored above eighty. The "cut-off" point at eighty was used in consonance with Pascal and Suttell's scoring system because they state, "on very practical grounds . . . the cut-off scores slide between 60 and 80, with the latter as a limiting score" (33, p. 36). However, an inspection of the data using sixty as the cut-off was also made for purposes of comparison. The hospitalized group showed ninety-four percent obtaining scores greater than sixty while of the non-hospitalized subjects thirty-nine percent had scores of sixty or above.

An analysis of Series 1 error scores shows that in the schizophrenic group seventy-one percent made no errors while eighty-nine percent in the non-hospitalized group made the correct choices in this task.

The Series 2 data were separated into two groups for analysis. The median error score was chosen to differentiate the groups. Results of this analysis reveal that forty-four percent of schizophrenics made greater than the median number of errors and thirty-nine percent of the non-hospitalized group made greater than the median number of errors. That is to say, fifty-six percent of the schizophrenic subjects made less than the median number of errors and sixty-one percent of the non-hospitalized population made less than the median number of errors.



Table 2

Percentage Distributions of Scores of Schizophrenic and Normal Subjects on Bender-Gestalt, Series 1, and Series 2

Subjects	Bender-Gestalt Scores		Series 1		Series 2 Errors	
	80	60	Error	Non-Error	0-1	2-6
Schizophrenics	75%	94%	71%	29%	56%	44%
Non-Hospitalized	7%	39%	89%	11%	61%	39%

But, in accordance with the major interest of this study, the results were analyzed to ascertain the relationship between the perceptual and motor performance aspects. The error scores on Series 1 ranged from zero to two, with only one score of two occurring. It was, therefore, most expedient to consider the scores as error or non-error. Series 2 scores varied from zero to six. The distribution was so skewed toward the lower number of errors that it was decided to dichotomize these scores also. The median number of errors was selected as the dividing point. Due to the peculiar nature of the data and the virtual necessity of dichotomizing one variable, the discrimination variable, a test of relationship between the motor performance (Bender-Gestalt score) and the perceptual phase (Series 1 and 2 scores) was obtained by determining the biserial correla-

tions (r_{bis}) for the Bender Gestalt score vs. Series 1 and Series 2 scores. In order to use the biserial correlation it was necessary to assume normality of distribution. This assumption was tenuous with the distribution of the data obtained. Therefore, it was decided to test the data without making the assumption of normality of distribution. The point biserial ($r_{pt.bis}$) was used to check the results to see if they might have been influenced by the assumption of normality if it were not warranted. The results are tabulated in Table 3.

Table 3

Biserial and Point Biserial Correlations for the Bender-Gestalt Scores vs. Series 1 and Series 2 Scores

Subjects	B-G vs. Series 1		B-G vs. Series 2	
	r_{bis}	$r_{pt.bis}$	r_{bis}	$r_{pt.bis}$
Total Population	-.098	-.069	.125	.099
Schizophrenics	-.009	-.007	-.110	-.087
Non-hospitalized	.125	.099	-.12	-.09

It seemed feasible to test the relationships in case the distribution was not rectilinear and to check the regressions of x on y as well as y on x. In the case of Series 1, the distribution was too clearly dichotomized,

hence assumptions for Eta could not be met. However, a correlation ratio was run on Bender-Gestalt scores vs. Series 2 with the following ratios resulting:

$Eta_{xy} = .486$ and $Eta_{yx} = .557$.

None of the coefficients of correlation is significantly different from zero.

Further statistical analyses of the data were attempted to determine systematically the interrelationships among the variables. Tests were run to ascertain the interactions among the diagnostic categories, the Bender-Gestalt scores, and the discrimination series scores. The relation between the Bender Gestalt scores and the discrimination series scores was tested. Finally, the effectiveness of the tests was checked.

Table 4

Interaction Test Analysis of Schizophrenic and Normal Scores on Bender-Gestalt (≥ 80) and Series 1

Series 1 Error Scores	Bender-Gestalt Scores			
	Schizophrenics		Normals	
	≥ 80	<80	≥ 80	<80
Non-Error	29	8	2	23
Error	10	5	0	3

Chi-Square (1 df) = 1.369 $P = .25$

Table 4 presents the Interaction Test of diagnosis vs. Bender scores ($\geqslant 80$) vs. Series 1 for the total population. The resultant Chi-Square of 1.369 is not significant at either the one or the five percent level of confidence. It can therefore be assumed that no difference existed between the schizophrenic group and the non-hospitalized group in their response to the tasks involved.

A similar Interaction Test was made using a cut-off at sixty on the Bender-Gestalt scores. Table 5 summarizes the results. A Chi-Square of .419 was obtained, but was shown to be not significant at either the one or the five percent level of confidence.

Table 5

Interaction Test Analysis of Schizophrenic and Normal Scores on Bender-Gestalt ($\geqslant 60$) and Series 1

Series 1 Error Scores	Bender-Gestalt Scores			
	Schizophrenics		Normals	
	$\geqslant 60$	<60	$\geqslant 60$	<60
Non-Error	36	1	11	4
Error	13	2	0	3

Chi-Square (1 df) = .419 $\quad$ $\underline{P}$ = .50

No significant differences between groups or between the scores on the Bender-Gestalt or Series 1 were found in this analysis. Hence, we may assume that the schizophrenic

population and the non-hospitalized group responded in similar manner to the tasks presented them and that whether the cut-off point was sixty or eighty made no difference in the final outcome.

When the diagnoses were not a variable, an analysis of the relationship between the Bender-Gestalt scores (using eighty as the cut-off point) and the Series 1 error scores was made for the total population by the Exact Chi-Square Method. A probability (P) .19 was found for that data, which are presented in Table 6. A P = .19 is not significant. It may be contended, then, that no difference existed between the responses of those who scored above or below the eighty cut-off point as related to their ability to discriminate the forms of the Series 1 task.

Table 6

Exact Chi-Square Test of Combined Schizophrenic and Normal Bender-Gestalt ($\geq$ 80) Scores and Series 1 Scores

Series 1 Error Scores	Bender-Gestalt Scores	
	$\geq$80	<80
Non-Error	31	31
Error	10	8

P = .19

Using sixty as the cut-off point, the Exact Chi-Square Method was also used to analyze the relation between the Bender-Gestalt scores and the Series 1 scores when the diagnoses were again not a variable. A summary of this data is presented in Table 7. When sixty is used as the limiting score, a P of .00 was obtained, indicating a significant difference between the scores achieved on the Bender-Gestalt test in relation to the Series 1 error scores.

Table 7

Exact Chi-Square Test of Combined Schizophrenic and Normal Bender-Gestalt ($\geq$ 60) Scores and Series 1 Scores

Series 1 Error Scores	Bender-Gestalt Scores	
	≥ 60	< 60
Non-Error	47	15
Error	13	5

P = .00

The Exact Chi-Square Method was also used to determine the relationship between the Bender-Gestalt scores and the Series 1 error scores for both the schizophrenic and the non-hospitalized groups. Bender-Gestalt cut-off points of eighty and then sixty were used in this analysis. The results are shown in Tables 8, 9, 10, and 11.

Table 8 shows the relationship of Bender-Gestalt scores to Series 1 scores for the schizophrenic group using an upper limit of eighty as the dividing point. A resultant $P = .18$ suggests that no difference exists in the selection of Series 1 items in the schizophrenic population regardless of Bender-Gestalt score when the limit is set at plus or minus eighty.

Table 8

Exact Chi-Square Test of Schizophrenic Bender-Gestalt (≥ 80) Scores and Series 1 Scores

Series 1 Error Scores	Bender-Gestalt Scores ≥ 80	Bender-Gestalt Scores < 80
Non-Error	29	8
Error	10	5

$P = .18$

A similar non-significant relationship ($P = .45$) was found when a Bender-Gestalt score of sixty was used to separate the groups of schizophrenics. The figures in Table 9 represent this analysis.

Table 9

Exact Chi-Square Test of Schizophrenic Bender-Gestalt ($\geq$ 60) Scores and Series 1 Scores

Series 1 Error Scores	Bender-Gestalt Scores ≥ 60	< 60
Non-Error	13	1
Error	36	2

$P = .45$

The Exact Chi-Square analysis was then applied to the normal group after dividing the population according to Bender-Gestalt scores above or below eighty. Table 10 shows that analysis.

Table 10

Exact Chi-Square Test of Normal Bender-Gestalt ($\geq$ 80) Scores and Series 1 Scores

Series 1 Error Scores	Bender-Gestalt Scores ≥ 80	< 80
Non-Error	2	23
Error	0	3

$P = .79$

The relationship between the Series 1 scores and the Bender-Gestalt scores using the eighty cut-off showed, once again, that no significant difference exists between the normal and schizophrenic groups based on $\underline{P} = .79$.

Table 11 presents the Exact Chi-Square analysis of Bender-Gestalt scores, with the cut-off point at sixty, and the Series 1 scores for the normal group. The value of $\underline{P} = .35$ shows another non-significant difference within the normal group between the two variables concerned.

Table 11

Exact Chi-Square Test of Normal Bender-Gestalt ($\geqslant 60$) Scores and Series 1 Scores

Series 1 Error Scores	Bender-Gestalt Scores $\geqslant 60$	Bender-Gestalt Scores < 60
Non-Error	11	14
Error	0	3

$\underline{P} = .35$

A final series of analyses were attempted to ascertain the effectiveness of the instruments used in this experiment. As the first test of effectiveness the Bender-Gestalt score relationship to the diagnoses was treated using the Exact Chi-Square technique. These results are

shown in Tables 12 and 13.

Table 12 presents the results of the analysis of the Bender-Gestalt scores, using the limit of eighty, and the diagnoses without regard to Series 1 scores. This analysis includes the total population.

Table 12

Exact Chi-Square Test of Total Population for Bender-Gestalt ($\geqslant$ 80) and Diagnoses

Diagnostic Category	Bender-Gestalt Scores $\geqslant$ 80	$<$ 80
Schizophrenics	39	13
Normals	2	26

$\underline{P} = .00$

The $\underline{P} = .00$ denoted that a real difference existed between those subjects classified as schizophrenics and the non-hospitalized group as determined by their Bender-Gestalt scores. These results suggest that differences did exist between the two groups in the abilities to reproduce the Bender-Gestalt stimuli as scored by the Pascal and Suttell (33) system.

Using sixty as the cut-off point for the Bender-Gestalt score, the analysis between that score and the

subjects' diagnoses was again made. Similar results were obtained and are presented in Table 13.

Table 13

Exact Chi-Square Test of Total Population for Bender-Gestalt ($\geqslant 60$) and Diagnoses

Diagnostic Category	Bender-Gestalt Scores $\geqslant 60$	<60
Schizophrenics	49	3
Normals	11	17

$P = .00$

In order to examine the effectiveness of Series 1 as related to the diagnoses, analysis was made by the Exact Chi-Square Method. The results of that analysis are presented in Table 14. The relationship between Series 1 error scores and the diagnoses were not significantly different at the one percent level. They were, however, significant at between the two and five percent levels. These results suggest that some differences in the ability to select "the <u>two most alike</u>" designs from the Series 1 choices were obtained between the two groups.

A similar systematic analysis of the Bender-Gestalt scores and the diagnostic categories was made with the

Series 2 scores. That data will be presented and discussed below.

Table 14

Exact Chi-Square Test of Total Population for Series 1 Scores and Diagnoses

Series 1 Error Scores	Diagnostic Categories	
	Schizophrenics	Normals
Non-Error	36	25
Error	16	3

$P = .026$

In Table 15 will be found the results of the Interaction Test analysis of the combined non-hospitalized and schizophrenic populations. The diagnostic categories were tested against both the Bender-Gestalt scores and the Series 2 error scores. Eighty was used as the limit for the Bender-Gestalt scores while the median number of errors was used to dichotomize the Series 2 error scores. The notation for the error score designation will be 0-1 and 2-6.

A Chi-Square value of 6.635 would have been needed to show a significant difference between the groups at the one percent level. Clearly, we may contend, then, that no difference existed between the schizophrenic and the non-

hospitalized subjects of our experiment in their responses to the Series 2 task.

Table 15

Interaction Test Analysis of Schizophrenic and Normal Scores on Bender-Gestalt ($\geqslant 80$) and Series 2

Series 2 Error Scores	Bender-Gestalt Scores Schizophrenics $\geqslant 80$	Schizophrenics < 80	Normals $\geqslant 80$	Normals < 80
0-1	24	5	1	16
2-6	15	8	1	10

Chi-Square (1 df) = .001 P = .95 (approx.)

Using the other cut-off alternative, sixty, a Chi-Square of .625 was yielded. This result, too, is not significant. It would occur by chance alone in from thirty to fifty percent of trials on an experiment of this nature. These results are recorded in Table 16.

Table 16

Interaction Test Analysis of Schizophrenic and Normal Scores on Bender-Gestalt ($\geqslant 60$) and Series 2

Series 2 Error Scores	Bender-Gestalt Scores Schizophrenics $\geqslant 60$	Schizophrenics < 60	Normals $\geqslant 60$	Normals < 60
0-1	29	0	7	10
2-6	20	3	4	7

Chi-Square (1 df) = .625 P = .45 (approx.)

The exact relationship between the Bender-Gestalt scores and the error scores of Series 2 were examined by combining the whole population and testing those scores by the Exact Chi-Square Method. Table 17 shows the results of that analysis when eighty was used as the cut-off point for the Bender-Gestalt scores. A probability of .213 is too high to accept the difference, as shown in this experiment, as being significant. Therefore, we assume that no difference exists between the groups which score above and below eighty on the Bender-Gestalt and the selections they made on Series 2 of the discriminations.

Table 17

Exact Chi-Square Test of Combined Schizophrenic and Normal Bender-Gestalt ($\geqslant 80$) Scores and Series 2 Scores

Series 2 Error Scores	Bender-Gestalt Scores	
	$\geqslant 80$	< 80
0-1	25	21
2-6	16	18

$P = .213$

The same analysis using sixty as the dividing point yielded the results which are presented in Table 18. The $P = .151$, which was obtained, indicates a non-significant

difference exists between the scores on the Bender-Gestalt and the Series 2 scores.

Table 18

Exact Chi-Square Test of Combined Schizophrenic and Normal Bender-Gestalt ($\geqslant 60$) Scores and Series 2 Scores

Series 2 Error Scores	Bender-Gestalt Scores	
	$\geqslant 60$	< 60
0-1	36	10
2-6	24	10

$P = .151$

Within each group an analysis was made between the Series 2 error scores and the Bender-Gestalt Scores. The following results were obtained for the schizophrenics. Table 19 summarizes the Series 2 error scores vs. the Bender-Gestalt scores with eighty used as the cut-off point. Within the schizophrenic group a slight tendency toward finding "good" Bender-Gestalt scores accompanying low error scores on Series 2 items was revealed by the $P = .046$ result of the above analysis when the Bender-Gestalt scores were differentiated at eighty.

Table 19

Exact Chi-Square Test of Schizophrenic Bender-Gestalt ($\geqslant 80$) Scores and Series 2 Scores

Series 2 Error Scores	Bender-Gestalt Scores	
	$\geqslant 80$	< 80
0-1	24	5
2-6	15	8

$P = .046$

The analysis of the relationship between the Bender-Gestalt and Series 2 scores of the schizophrenic population was repeated with the Bender-Gestalt scores divided at sixty. The results are in Table 20.

Table 20

Exact Chi-Square Test of Schizophrenic Bender-Gestalt ($\geqslant 60$) Scores and Series 2 Scores

Series 2 Error Scores	Bender-Gestalt Scores	
	$\geqslant 60$	< 60
0-1	29	0
2-6	20	3

$P = .080$

The resultant $P = .08$ was beyond even the upper limit of

of acceptability at the .05 level of probability, and any difference in the relationship between the scores greater or less than sixty on the Bender-Gestalt and Series 2 scores must be rejected.

The relationship of Series 2 scores and Bender-Gestalt scores of the non-hospitalized group was analyzed. The results, when eighty was the dividing point, are presented in Table 21. A $\underline{P} = .493$ indicates that differences as great as those which occurred could be expected about half the time due to chance alone. Therefore, we may conclude that the non-hospitalized subjects responded in like manner to the discrimination task regardless of their response to the drawing task when that task was scored above or below eighty.

Table 21

Exact Chi-Square Test of Normal Bender-Gestalt (≥ 80) Scores and Series 2 Scores

Series 2 Error Scores	Bender-Gestalt Scores	
	≥ 80	< 80
0-1	1	16
2-6	1	10

$\underline{P} = .493$

Table 22 presents the relationship, once again, between the responses to Series 2 and the Bender-Gestalt scores of the non-hospitalized group. In this analysis, however, the dividing point of sixty was used for the Bender-Gestalt scores. The P for this analysis, too, suggests that in the non-hospitalized group the ability to choose the correct "two most alike" items bears little relationship to the ability to reproduce accurately the Bender-Gestalt designs when a score of sixty was used to separate the drawings into two groups.

Table 22

Exact Chi-Square Test of Normal Bender-Gestalt (≥ 60) Scores and Series 2 Scores

Series 2 Error Scores	Bender-Gestalt Scores	
	≥ 60	< 60
0-1	7	10
2-6	4	7

$P = .299$

A discussion of the relative effects of differentiating diagnostic groups on the basis of Bender-Gestalt scores has been previously made. (Refer to Tables 12 and 13.) Those results definitely suggest that the hospitalized and non-hospitalized groups responded differently to the

task of reproducing the Bender-Gestalt designs.

Series 2 and diagnostic groups were tested by the Exact Chi-Square Method for the effectiveness of Series 2 to differentiate between the diagnostic groups. The results of that analysis are presented in Table 23. The resultant P of .172 lies above the limits of significance. We conclude then that schizophrenics and normals responded in the same way to the Series 2 task and that no difference existed in their abilities to match the items.

Table 23

Exact Chi-Square Test for Total Population of Series 2 Scores and Diagnoses

Series 2 Error Scores	Diagnostic Categories	
	Schizophrenics	Normals
0-1	29	17
2-6	23	11

P = .172

A summary of the analyses is presented in Table 24. A recapitulation of the results follows.

Only the Bender scores vs. the Series 1 Scores (3b), the Bender ($\geqslant 80$) vs. Diagnoses (4a, 8a) and the Bender ($\geqslant 60$) vs. Diagnoses (4b, 8b) showed significant differences beyond the one percent level of confidence.

Table 24

Summary of Statistical Analyses of Data

1. Bender-Gestalt Score vs. Series 1 Score vs. Diagnoses:
   (a) Combined Diagnoses:
   Bender vs. Series 1 — $r_{bis} = -.098$
   (b) Combined Diagnoses:
   Bender vs. Series 1 — $r_{pt.bis} = -.069$
   (c) Schizophrenics:
   Bender vs. Series 1 — $r_{bis} = -.0089$
   (d) Schizophrenics:
   Bender vs. Series 1 — $r_{pt.bis} = -.007$
   (e) Non-Hospitalized:
   Bender vs. Series 1 — $r_{bis} = .112$
   (f) Non-Hospitalized:
   Bender vs. Series 1 — $r_{pt.bis} = .066$

2. Interaction Tests of Relations Between Bender-Gestalt Scores, Series 1 Scores, and Diagnosis (Chi-Square, 2x2x2):
   (a) Bender Scores ($\geqslant 80$) vs. Series 1 vs. Diagnosis — $P = .25$
   (b) Bender Scores ($\geqslant 60$) vs. Series 1 vs. Diagnosis — $P = .50$

3. Exact Chi-Square Relations Between Bender-Gestalt Score and Series 1 Scores:
   (a) Combined Diagnosis:
   Bender ($\geqslant 80$) vs. Series 1 — $P = .19$
   (b) Combined Diagnosis:
   Bender ($\geqslant 60$) vs. Series 1 — $P = .00$
   (c) Schizophrenics:
   Bender ($\geqslant 80$) vs. Series 1 — $P = .18$
   (d) Schizophrenics:
   Bender ($\geqslant 60$) vs. Series 1 — $P = .45$
   (e) Non-Hospitalized:
   Bender ($\geqslant 80$) vs. Series 1 — $P = .79$
   (f) Non-Hospitalized:
   Bender ($\geqslant 60$) vs. Series 1 — $P = .35$

4. Exact Chi-Square Tests of Effectiveness of Tests:
   (a) Combined Series 1:
   Bender ($\geqslant 80$) vs. Diagnosis — $P = .00$
   (b) Combined Series 1:

Bender ($\geq$ 60) vs. Diagnosis — $P = .00$

(c) Combined Bender:
Series 1 vs. Diagnosis — $P = .026$

5. Bender-Gestalt Score vs. Series 2 Score vs. Diagnoses:
   (a) Combined Diagnoses:
   Bender vs. Series 2 — $r_{bis} = .125$
   (b) Combined Diagnoses:
   Bender vs. Series 2 — $r_{pt.bis} = .099$
   (c) Combined Diagnoses:
   Bender vs. Series 2 — $Eta_{xy} = .486$
   (d) Combined Diagnoses:
   Bender vs. Series 2 — $Eta_{yx} = .577$
   (e) Schizophrenics:
   Bender vs. Series 2 — $r_{bis} = -.110$
   (f) Schizophrenics:
   Bender vs. Series 2 — $r_{pt.bis} = -.087$
   (g) Non-Hospitalized:
   Bender vs. Series 2 — $r_{bis} = -.12$
   (h) Non-Hospitalized:
   Bender vs. Series 2 — $r_{pt.bis} = -.09$

6. Interaction Tests of Relations Between Bender-Gestalt Scores, Series 2 Scores, and Diagnosis (Chi-Square, 2x2x2):
   (a) Bender Scores
   ($\geq$ 80) vs. Series 2 vs. Diagnosis — $P = .95$
   (b) Bender Scores
   ($\geq$ 60) vs. Series 2 vs. Diagnosis — $P = .55$

7. Exact Chi-Square Relations Between Bender-Gestalt Score and Series 2 Scores:
   (a) Combined Diagnosis:
   Bender ($\geq$ 80) vs. Series 2 — $P = .213$
   (b) Combined Diagnosis:
   Bender ($\geq$ 60) vs. Series 2 — $P = .151$
   (c) Schizophrenics:
   Bender ($\geq$ 80) vs. Series 2 — $P = .046$
   (d) Schizophrenics:
   Bender ($\geq$ 60) vs. Series 2 — $P = .080$
   (e) Non-Hospitalized:
   Bender ($\geq$ 80) vs. Series 2 — $P = .493$
   (f) Non-Hospitalized:
   Bender ($\geq$ 60) vs. Series 2 — $P = .299$

8. Exact Chi-Square Tests of Effectiveness of Tests:
   (a) Combined Series 2:
   Bender ($\geq$ 80) vs. Diagnosis — $P = .00$
   (b) Combined Series 2:
   Bender ($\geq$ 60) vs. Diagnosis — $P = .00$
   (c) Combined Bender:
   Series 2 vs. Diagnosis — $P = .172$



The Series 1 Scores vs. Diagnosis (4c) analysis resulted in a significant difference at the .026 level of confidence. And the Bender ($\geq$ 80) vs. Series 2 Scores (7c) for the schizophrenic group was significant at the .046 level of confidence. All other differences were not significant.

In other words, no relationship between the Bender-Gestalt scores and Series 1 or 2 error scores was evident as shown by the correlational analyses. Differences between the Bender-Gestalt scores and the discrimination scores are shown in the case of Series 1 when the cut-off point is at sixty and the total population was analyzed (3b). Series 2 Scores and the Bender-Gestalt score differences are just within the five percent limit of significance for the schizophrenic population (7c). This evidence does not seem conclusive enough to warrant any statements that actual differences exist between normal and schizophrenic groups on the discrimination series tasks. Only the Bender-Gestalt score relations to the diagnoses yield clear-cut differences. We, therefore, reject hypothesis one that there is no difference between the motor performance of normals and schizophrenics on the Bender-Gestalt and we accept hypothesis two that there is no difference between the discrimination of schizophrenics and normals in the perceptual phase of the Bender-Gestalt as a result of our findings.

We might interpret the findings accordingly and simply state that normals and schizophrenics do respond differently

in the execution of a "work sample" task, and that normals and schizophrenics show a somewhat similar ability to discriminate between designs. However, in keeping with our earlier premises, further discussion is necessary.

First, let us examine, in the light of our findings, the validity of the assumptions made by Pascal and Suttell in assigning differences in execution of Bender-Gestalt designs to interpretative factors. Simply stated, Pascal and Suttell have outlined the elements involved in reproducing the stimuli as perception, interpretation, and execution, and have posited that deviations in execution are a function of the interpretative factor rather than the perceptual phase, as defined by them. Our results have demonstrated that the schizophrenic group and the normal group differ in their ability to execute the Bender-Gestalt designs. They have shown further that the performances of the two groups are similar in the perceptual phase. Having ruled out the perceptual aspect, we may assume, with Pascal and Suttell, that the differences in execution may be assigned to the interpretative function.

Having thus further established the validity of the Bender-Gestalt Test as a diagnostic instrument and ascertained a degree of knowledge about the behavior involved in reproducing the designs of that test, we may now engage in an examination of the schizophrenic process in light of our findings.

Having "isolated" the perceptual phase from the interpretative phase in this study and having substantiated the fact that differences in the execution of the designs occur between schizophrenics and normal subjects we may speculate as to the relative "strengths" of the three components in the total response.

Referring to Appendices A and B we find ample evidence in the remarks of our schizophrenic subjects to the effect that they recognize their own inability to produce good likenesses of the designs. We also have evidence that the stimulus is seen "as it is," though some meaning is ascribed to the symbols by some subjects.

Case history material regarding the schizophrenic's distortion of stimuli corroborates the verbal data gathered during this experiment. Many remitted schizophrenics discuss freely their remenbrances of the situations in which they found themselves during their psychotic episodes. They do recall the actual situations and in many events, for example, they have interpreted the motives of the staff members attending them as trying to help them, but they are "powerless" to respond. Testimony of this kind is frequently found in the literature.

This admittedly meagre evidence does, however, raise some questions as to the fullest acceptance of the Pascal and Suttell position that the interpretative factor is the seat of involvement in the schizophrenic process. With our

study we have virtually ruled out the perceptual phase as described by Pascal and Suttell. The logical deduction from the theoretical approach we have used is that the involvement is one of either the interpretative function or the inability to execute the tasks because of an inability to control the response itself. With the verbalizations, to which we have referred, raising some doubts, it would behoove us to follow one or both of two lines in further investigations. We might further investigate the interpretative phase of the response continuum and/or we might explore the schizophrenic process from the point of view of a control disfunction, perhaps study the schizophrenic process as something similar to aphasia. Both approaches warrant further thought and research.

It should be stated that the present study has not resulted in a conclusive formulation of the schizophrenic process because of certain limitations among which are the following: We are at once confronted with terminology problems, the extreme difficulty of assessing the meaning a stimulus has for an individual. That is to say, perception, as defined by Pascal and Suttell, was the same for both our experimental groups, and nothing in the study indicated that as sharp a cleavage existed between the perceptual function and the interpretative function. The question of whether "seeing" and identifying of an object, e.g., circle and square in Design A (perception), is carried out apart

from the meaning of the task for the subject (interpretative) is still unanswered. Another limitation is the lack of sensitivity of present instruments to divulge necessary information to lead to adequate exploration of this phase of behavior.

As is the case with most experiments, the implications which arise in connection with the experiment proper usually far outweigh the main project itself. It now seems very important to reevaluate our thinking in the general area of testing and diagnoses, e.g., the Rorschach and interpretations of that test, taking into consideration the relative aspects of the factors we have discussed.

Gestalt principles, too, may have new light shed upon them as we learn more about the function of the various phases of the total perceptual process and these factors are taken into consideration.

Even the conceptual thinking related to ego may be assessed in general, as discussed by Pascal and Suttell and especially as it is discussed in terms of the schizophrenic process. For example, Bosselman, in characterizing the schizophrenic states:

> The reality denials of the schizophrenic patient represents the most extreme degree of ego failure. This patient, unable to cope with his adaptive problems, denies that they exist. His ego relinquishes its perceptive function and no longer makes contact with the objective world. Interest is focused within and the patient lives, we say, autistically, in fancy rather than in reality (9, p. 123).

Finally, more extensive thought might well be given to the schizophrenic process and its treatment. A word about treatment of mental patients on the basis of our speculations seems in order. It would appear that some experimental substantiation for the continuation of some of the present methods of therapy might well be based on a clarification of the role that the interpretation of a stimulus plays in one's total perception of a situation. That is to say, if a patient "sees" and "interprets" a situation "correctly" regardless of his response to it, we would have endorsement for the kinds of treatment of the mentally ill presently advocated by dynamically oriented psychologists and psychiatrists--otherwise the simple incarceration of a mental patient would suffice, thus saving much money and manhours.

CHAPTER IV

SUMMARY AND CONCLUSIONS

This study was instigated primarily to investigate the factors involved in the reproduction of Bender-Gestalt designs by normal and schizophrenic subjects. In this way it was hoped that further knowledge might be gained about the schizophrenic process as some of the assumptions of the Bender-Gestalt test were explored.

It had been shown by other investigators that on "work sample" tasks, such as in the Bender-Gestalt and similar tests, the execution or performance of schizophrenics differed vastly from that of normals. The results when loosely interpreted have led to the conclusion that schizophrenics do not perceive, in the sense of seeing, as others do. More cautious investigators have left their interpretations at a more general level of perceptual differences, defining perception psychologically. This investigation was undertaken in an attempt to resolve some of the ambiguities of the present state of theory concerning both testing and the conceptions of schizophrenia.

A thorough understanding of a diagnostic instrument

is necessary in order that its research potential may be fully utilized. The study was, therefore, twofold and the following hypotheses were tested:

1. That there is no difference between the motor performance of normals and schizophrenics on the Bender-Gestalt.

2. That there is no difference between the discrimination of schizophrenics and normals in the perceptual phase of the Bender-Gestalt.

The experiment included copying Bender-Gestalt designs individually on four inch by six inch white cards. The cards were slipped into a specially constructed board with two other Bender designs, an original stimulus card and a traced copy. Another set of designs was prepared containing a Bender-Gestalt stimulus card, a traced copy, and two free hand reproductions. Upon completion of the drawing the subjects were asked to select "the two which were <u>most</u> alike" from both series. The two series were presented. The subjects' reproductions were scored by the Pascal and Suttell (33) scoring system. A comparison between the Bender-Gestalt scores and the discrimination scores was made using r_{bis}, $r_{pt.bis}$ and Eta correlation techniques. Other relationships, such as analyses of interactions among Bender scores, Series 1 and 2 scores, and diagnoses were examined using Chi-Square methods.

The total population for this experiment included

eighty subjects. The fifty-two subjects of the schizophrenic group were composed of twenty-nine females and twenty-three males, all diagnosed and selected by the staff of a state mental institution. The group was made up of all classifications of schizophrenia, e.g., simple, hebephrenic, catatonic, and paranoid. All subjects were of at least normal intelligence and no complicating features, viz., organic brain damage, paresis, epilepsy, etc., were evident. The ages ranged from sixteen to sixty and all levels of scholastic achievement were included in this group.

The results showed that no significant relationship existed between the Bender-Gestalt scores (the motor aspect) and the scores on the perception tasks when tested with biserial, point-biserial, or correlation ratio techniques. Significant differences existed only when Bender-Gestalt scores were tested against diagnostic categories and when the relationship between the Bender-Gestalt scores and discrimination error scores on the first series was tested, using the lower cut-off limit of sixty suggested by Pascal and Suttell (33). (This limit is used to differentiate "non-psychotic drawings" from "suspect"--between sixty and eighty--and "psychotic" reproductions.") Differences between discrimination on Series 1 and diagnostic categories existed at the .026 level of probability, and differences between Bender-Gestalt scores and error scores on discrimination of the Series 2 was at the .046 level of significance

when Bender-Gestalt scores were divided at the upper limit of eighty.

On the basis of these findings we can feel safe in rejecting our first hypothesis, that there is no difference between the execution of normals and schizophrenics on the Bender-Gestalt. The results apparently sustain the hypothesis that there is no difference between the discrimination of schizophrenics and normals in the perceptual phase of the Bender-Gestalt. We therefore accept hypothesis two.

APPENDIX A

SOME SCHIZOPHRENICS' VERBAL DESCRIPTIONS OF BENDER-GESTALT DESIGNS

Subj. 1: (Design A) "O and square . . . window and ledge . . . square with ends off and road marker."

(Design 7) "I don't know how to tell you to draw that . . . square or oblong with points, one sharper than other." /S. pointed to ends of design when referring to "sharper than others."/

Subj. 2: (Design A) "Oh I don't know . . . I think I have studied but don't . . . well that looks like a lamp shade instead of a diamond /turned card on side/ . . . like I drew more lopsided."

(Design 1) "This one /S's own/ off line."

Subj. 3: (Design A) "That's an O and I'd call that a box or something."

(Design 2) "O's or dots in threes . . . they're not very straight, they're kind of slanting like."

(Design 4) "Well, I don't hardly know. I don't know how to start in . . . looks like a C and a U."

(Design 7) "Well it looks like a smoothing ironing boards . . . one kind of drawed on other just a little, not very much."

Subj. 4: (Design A) "Circle and square with one of the corners attached to the circle."

(Design 4) "Three straight lines attached in shape of square, no that not good, square with one side missing attached to irregular line-- it's attached to middle of irregular line."

(Design 5) "Well it's a . . . circle, a portion of a circle with a line -ah- extending from the outside that consists of seven dots and a portion of a circle consists of nineteen dots."

(Design 7) "Is a six sided form, uh . . . Two six sided forms attached to each other . . . They are at an angle, only thing is there is same distant in length between sides of other object."

Subj. 7: (Design A) "Well, wouldn't it be an oval and a diamond, you might be able to use it as a circle and a square, square would diagonal."

(Design 3) "A type of arrow of dots."

(Design 4) "That would be a simplicity diagram . . . well don't they use diagrams in demonstrating simplicity lines--formal make up, formal training . . . (Q) . . . square and simplicity curve."

Subj. 8: (Design A) "Circle with square; diameter of circle equal to diagonal of square etc., etc., . . ." /E's notes: gave good description--described angles as equaling; diameter of circle, etc.; "vertex of diameter of square, diameter of square on same line."/

Subj. 14: (Design 1) "I'd just say it was twelve dots in a row."

(Design 2) "Parallel rows of O's or should say three rows of O's--slanted."

(Design 7) "I don't know how to describe--let's see two long sides on each one and one peak on each one is long and one peak on each one is short--designs are on each other /S. used hands in gesture/."

Subj. 16: (Design A) "First I want a circle, a round all purpose circle, to right of it I want a square with left side of square pointing toward circle with other points pointing up and down and other point pointing in opposite circle."

(Design 4) "This is three straight lines with two straight lines pointing upwardly and third straight line pointing toward basis on which it is designed. The design is just a curve curved U backwardly with the . . . second part of square facing middle of design."

(Design 5) "Uh . . . this is nineteen dots successfully, excuse me, successfully!! successively!!! . . . with seven between the eighth and ninth dot in rotation."

Subj. 17: (Design A) "Round circle and square."

(Design 1) "Dots in straight line."

(Design 2) "Circles--three lines--at angle."

(Design 6) "Wavy lines crossing."

(Design 7) "Bullets in each other."

Subj. 20: (Design A) "Square and circle . . . square on side, standing on point."

(Design 4) "I don't know . . . just an uneven line against . . . I can't remember arithmetic."

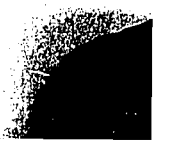
(Design 7) "I can't tell what you're teaching."

Subj. 30: (Design 7) "/S. pointed/ . . . part pointed and part in shape of paddle--a drawing with six lines and six points crossing each other--beer can or bottle opener-- . . . kinda' looks like top of church building--bottom--whole looks like pencil."

Subj. 33: (Design 4) "Well that looks like a--kind of, an S with H in it; purpose was to make HS . . . It like table turned on back--this looks like igloo, you know, a cold weather igloo."

(Design 7) "Two oblong triangles . . . used as cubic measures . . . two flat angles with six sides . . . well, triangles crossed because of some difficulty--it's a mystery--a difficult mystery--a hardship . . . This is diamond--eating on table and they playing ball interrupting you while eating, might even had grand stand, a concrete stadium--milk liquor."

(Design A) "A circle and a square--a round circle and a diamond square."



APPENDIX B

SOME SPONTANEOUS REMARKS OF SCHIZOPHRENIC SUBJECTS DURING THE COURSE OF COPYING BENDER-GESTALT DESIGNS

Subj. 6: (Design A) "That isn't round, is it? I'd need a ball to go round it this morning--I'd have to have an acorn. That looks like an Easter egg. Just 'cause this looks like an Easter egg it's not my fault. Use snake eggs for skin plaster (. . . sent to Africa and mountains for chemistry--to study what tics made of--had to pay own way, etc., etc., . . .) Still an Easter egg but O. K."

(Design 1) "I don't guess it makes much difference which is bigger. . . . That nigger-town for automobiles. That too big for gnats."

(Design 2) "Now this doesn't look like that! Maybe this is oil wells I don't know? Maybe it's mud wells. Would like to study cotton from time you grow cotton till time you make butter out of it. Did you ever study cotton?" /Talked about nursing study in Chicago at All-American./

(Design 3) "That doesn't look like it."

(Design 4) "That looks like a helmet. I used to do this in Primer class. I did as good a job then as I do now."

(Design 5) "That doesn't look much like it but you can tell what it's supposed to be. . . I think I'll make this one with teeth like a rake. Now this is a rake believe it or not. Ain't it cute?"

(Design 6) "That looks like a couple of rattlers. I think I'll name one of them Steen. I don't know who I'll name the other one."

(Design 7) /Talked about locust./ "Sounds like our brass band. . . That's really not much artist work. My horse looks better than that. . . That looks like fence post without fence."

(Design 8) "You supposed to have a T-square to make these lines straight. . . railroad picture I don't know if I could make a railroad picture. You been around as much as I have that's why you are crazy, ha! . . . That's going to be the best jigsaw puzzle you ever saw. . . . It takes practice to do this, like an architect."

Subj. 7: "I'm not good at drawing."

(Design A) "That not good but something on order of it."

(Design 3) "I'll bet you think I'm looney as bad as I draw."

(Designs 4,5,6) /Kept talking to self in whisper about/ "I'm mixing it up."

Subj. 8: (Design A) "It's rough drawing. . . erase? That's really a square and I don't make it."

(Design 3) "Oh this is a straight line and it's not supposed to be."

(Design 4) "I'm not good at drawing what I see. . . I can tell you what it is in words, but can't do it."

(Design 7) "If I used a ruler I could make it more accurate. . . I could do it over and make it better."

Subj. 9: (Design A) /While drawing/ "It isn't a right angle."

Subj. 10: (Design 2) "I'm not slanting that as much as it ought to be. . . I wouldn't mind doing that over . . . I believe I'll let it go at that but it's not as good as it's supposed to be."

(Design 3) "I spaced it not as good as you."

(Design 6) "It's not very good."

(Design 7) "Oh no! . . . That might be some better than other one but not much." /second try/

Subj. 11: "I see the way it is but can't draw it. . . . Some people can see it the way it is, but just can't draw it."

Subj. 12: (Design A) "That's supposed to be O and square."

(Design 1) "That's not very even."

(Design 2) "That goes up too much."

(Design 3) "Person ought to have good eyesight."

(Design 4) "I'm no Chinese artist. . . . That doesn't look good enough. . . . I guess it looks a little like it."

(Design 5) /Counted dots aloud./

(Design 7) "One not very even as other."

Subj. 13: (Design A) "That's a circle. That comes midway of it and that's a square. To make a circle I need a string, I studied geometry. I'm afraid I'm not much of an artist. I don't practice much, I've been in here so much. Now that's a square with one end in here. That's not a circle, I can tell that. It's a circle but not a perfect one . . . Doesn't look like it . . . let's see it's slant, etc."

(Design 1) /counted dots/ "Twelve, bet it don't come out like that one . . . Oh well! . . . The pencil won't do what I want as far as I'm concerned . . . but right here it isn't right, a little crooked. /Mumbles to self./ This isn't right, etc."

(Design 2) "This should be bigger. . . let's see, this won't be wide enough, etc., etc. Oh damn! That's slanted too much, that not enough. That looks a little more like it but that one don't look good at all. This is the hardest one. I was thinking I had to put twelve--but can't put more than they have down there, let's see if I can put eleven. This looks exactly like some little old kid messed around it. I just have to get that over. I could make it a little straighter . . . mm! mm! I know what I'm trying to do but that ain't very good.

(Design 4) "I know I can do better work, but under the circumstances . . . It's another square . . . That's just a little to left /measured/. To make this /curved line/ it's a little more complicated . . . I sure don't seem to be having much success with this . . . Would that perchance do?"

(Design 5) /counted dots/ "That's nineteen. Half of nineteen is eight no that's sixteen.

Let's see I'll put the center one here. That's not the shape . . . That's not going to look like that. Isn't it strange how one person can copy it, well it's not going to matter much."

(Design 6) "That's a curve, not exactly a . . . looks like a mountain doesn't it and this one half through other . . . That's supposed to slant out there but I see there's much difference. I want that to slant but I didn't get it to slant, but it doesn't slant so very much. I guess that would do. I don't like it very well but, . . . will that do?"

(Design 7) /Measured with pencil lengths of line, etc./ "That line not long enough . . . That's not like that I can see that. I sure can't get that, it's just a little off but sure makes a difference. What do you think of that? It's not like this one but it does have idea of it. It's a little bit like it. That line should be a little longer. That's a straight line but I can't get it. It comes to a point and this is a funny part. That should be straight but the lines, the angle isn't right. Well I swear, every time I go back it doesn't look like it. This needs . . . It's a little strange, it comes this way and it's slanted but this sure . . . This is a puzzle, let's see how I slant it. This line then this line, it takes patience to do anything to him. Let's see there's a figure, it has a line and an angle--a line, then it comes to there . . . I don't know, that may be a little like it but that's all. . . I can see that it comes here and it comes here but I can't make it go there. It sure is doing strange things. That don't look right but I'll just let it go. I'll just take that line out. That looks terrible with so much erasing. I'm afraid I'm not smart after all but I don't know if this is a judge . . . It looks like bullets. I have it more of its shape than it was. I don't think that line there is absolutely straight anyway. Well I guess that's about as good as I can do . . . it ain't very good. These lines should be equal, I don't believe it is yet. That sure is hard. Were these made by hand? It just takes patience, patience, patience. I think I'll let it go at that but don't have it even /measured/. Yes I believe

it's longer here. That's wider than the other one and they supposed to be even. Here line very short line /counted/ five lines . . . Now that part of same line. I'll tell you this is really a . . . I'll remodel it. That looks kind of different but supposed to be same size. It don't matter much I guess. Oh well, I'd better let it go. I've been laboring over it too much."

Subj. 14: (Design A) "I'm getting nervous. I can't make my hand do what I want it to. . . . Sometime can't make mind do what we want it to."

Subj. 15: (Design 4) "That doesn't look much like yours but it's general idea."

Subj. 16: (Design 3) "Some of these don't look like they were meant; they are somewhat larger but, ..."

(Design 4) "I'm going to turn it around now to get my design correct."

Subj. 17: (Design 5) "That doesn't look exactly like it, the beehive, I'm trying to get it exactly like the beehive that's exactly what I'm trying to do."

Subj. 18: (Design A) "You mean draw a circle and square? Wouldn't you know it? Mercy!"

(Design 2) ". . . Well you'd never know it for the same . . ."

(Design 3) "This is supposed to be triangle shape."

(Design 4) "Both curliques supposed to be the same. I haven't even got that in center."

(Design 5) "That's too off center. Sure doesn't look like pattern, does it? That isn't even straight on the card."

(Design 6) ". . . I think I shall better count the little hills--hills and valleys. Much too close to edge--and I know it but I can't fix it . . ."

(Design 7) "Those not even the same size . . . Well, I got 'em the same and it's plain to see that they shouldn't be . . . I had that falling over a lot more than it should. I discovered that after I drew it--you'd never know it for one if you put it down together. I can see how they should be but I never can do it. Ohh! That's just as centered as can be and I'm way off."

(Design 8) "I know that's supposed to be triangle but all I can draw is squares--it's a perfect little diamond . . . If I could put it on center of page now."

Subj. 20: (Design 4) "That's no good! I'll try again I guess I didn't make a curve."

Subj. 22: (Design 4) "These are not distributed as well as others. I know very well that's not good but I can't do better."

(Design 6) "Driving me nuts trying to figure them out--to put them down."

Subj. 23: (Design 6) "I have one more thing than you have there."

Subj. 24: (Design 2) "It doesn't look a bit like it."

Subj. 26: (Design A) "It doesn't compare with that one."

(Design 1) "This is not a straight line like the other one."

Subj. 27: (Design 6) ". . . supposed to go up but I didn't make it."

Subj. 28: (Design 8) ". . . Not spaced quite like others."

Subj. 31: (Design 1) "That don't lock like it."

(Design 3) "I got 'em too close I guess."

(Design 4) "I kinda got up on there."

Subj. 32: (Design A) "That's just a round ring. I'm too nervous, that not straight. If I could hold still I'd make it better. I can't draw anything but it looks easy."

(Design 5) "That's not much like it."

(Design 7) "Too many crooks and turns in this . . . Oh hell I can't figure that one."

Subj. 39: (Design A) "Doesn't look like anything but a circle and a square."

Subj. 40: (Design 1) /Counted dots/ "There are twelve of 'em, I'm wrong. I only have ten."

(Design 3) ". . . I can't draw shape like one they have."

(Design 5) "Mine looks more like a Y than a U." /Card reversed./

(Design 6) "Well, I got more angle on it than they do."

Subj. 43: (Design 1) "Twelve dots to card. Now these I don't say will be like that. Incidentally I haven't got them as far across the page as those but I have the twelve dots."

(Design 2) "Well that's the same amount. I wouldn't say it looks exactly like it."

(Design 5) "I may have one more dot on left side /counted/ no I got two more I can go. That's not as bad as I expected. I thought I'd have to get too many dots to get it even."

Subj. 47: (Design 3) "I got it down there where it's not much like it."

Subj. 51: (Design 1) "I got one more on there."



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