8-1977

Indicators of Anxiety on Bender Records: A Correlational Study

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1977

INDICATORS OF ANXIETY ON BENDER RECORDS: A CORRELATIONAL STUDY

A Thesis

Presented to

the Faculty of the Department of Psychology

Western Kentucky University

Bowling Green, Kentucky

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

by

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August 1977

INDICATORS OF ANXIETY ON BENDER RECORDS:

A CORRELATIONAL STUDY

Recommended 7-19-77
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INDICATORS OF ANXIETY ON BENDER RECORDS:
A CORRELATIONAL STUDY

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Since the Bender's growth in popularity as a tool for assessing organic brain damage, other factors have been shown to influence the accuracy of design reproductions. Mental deficiency, cultural background, early age and sex are among those factors. Attempts to demonstrate the effects of personality traits have been few, but supportive. Research into the influence of personality on Bender performance has largely been group comparison designs. The degree of overlap found among groups has reduced the degree of confidence with which the results can be applied to individual performances. The present study used a correlational approach to determine how validly State and/or Trait Anxiety can be predicted from Bender records.

Results indicated significantly more positive correlations than chance between 22 of the Bender deviations and deviations scored for severity and both the State and Trait Anxiety measures. This supported the hypothesis that Bender deviations are affected by the presence of anxiety. A factor analysis of the Bender records did not produce any robust factors, probably because of the high sample homogeneity with

respect to their Bender performance. Alpha coefficients were increased from those obtained on the Deviation Total and Deviation Severity scales by selecting two subscales from each, based on the item-total coefficients of the deviations. Correlations consequently increased with State and Trait Anxiety on three of the four subscales. Lastly, a step-wise multiple regression procedure was applied to both the Deviation Total and Deviation Severity scale to obtain multiple Rs with State and Trait Anxiety. Adding deviations continued to increase the multiple R of the lists through eight to thirteen steps. Corrections for the small sample size estimated the possible shrinkage of the multiple Rs.

Discussion focused on finding no correlations between age, sex and Bender performance, as expected. It also stressed some of the procedural flaws and data assumptions, most noticeable of which was the need for a more reliable Bender scoring blank for further research. Finally, it was concluded that the results supported the hypothesis that Bender deviations are influenced by anxiety. However, the results further pointed out that Bender deviations, as presently defined, are affected by other factors as well. It was therefore cautioned that Bender reproductions should be considered only a rough predictor of the presence and extent of anxiety in an individual.

Indicators of Anxiety on Bender Records: A Correlational Study

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The Bender Gestalt Test has become the most widely used psychological test in the United States today (Lubin, Wallace, & Paine, 1971). The original geometric figures were first introduced by Wertheimer in 1923. Lauretta Bender modified nine of these designs and used them to study perceptual maturation. The set currently printed by the American Orthopsychiatric Association is a reproduction of those figures. The set consists of nine index-type, white, unlined cards, each one having a different geometric design on one side. The examinee is usually requested to copy each of the designs, one at a time and freehand, on a separate sheet of paper. The reproductions are evaluated according to how closely they resemble the original designs. Bender's work provided much of the impetus for the practice of using the designs to test for organic brain damage (OBD). Since then, research on the Bender has taken at least three major directions: a) it's use as an indicator of OBD, b) the effects of variables such as age and cultural background on Bender performance, and c) it's potential for implicating personality traits or dynamics.

Bender Use for Diagnosing OBD

Research on the applicability of the Bender in cases where OBD is suspect has largely been supportive. Fjeld, Small, Small, & Hayden (1966) compared the relative efficacy of the Bender, the Mental Status evaluation (MS) and the EEG for diagnosing OBD. The Bender was found accurate in 79% of the 97 cases to whom all three tests were administered. No significant difference was found between the Bender's accuracy and that of the EEG. The MS located all 20 of the OBD cases. In a similar type of study, Brilliant & Gynther (1963) compared the relative performance of three psychological tests frequently used when OBD is suspect: the Bender, Benton Visual Retention Test and the Memory-for-Designs Test. Judgments made with the Bender results led to the correct diagnosis of 92% of the OBD cases and 67% of the nonorganic group. It's combined group accuracy of diagnosis was 82%, the highest of the three tests. Rosencrans & Schaffer (1969) and Hain (1964) have concluded that the Bender is more sensitive to diffuse OBD than to localized trauma, parietal lobe lesions being one exception (Garron & Cheifetz, 1965). Mosher & Smith (1965) have cautioned that the accurate reproduction of Bender figures by patients cannot rule out OBD since great variability is observed in the performances of OBD cases. They do agree that the greater the frequency and severity of design deviations the greater the likelihood of OBD.

Research on the Bender as a detector of OBD is hampered

by at least two problems. The first is that a definite diagnosis of OBD cases used in experiments often cannot be made without an autopsy (Fjeld et al., 1966). The second problem is that the same type of deviation observed on the Bender records of OBD cases can also be found on records of cases with just a psychogenic disorder. Some of the research has addressed this problem of differentiating functional and organic disorders by Bender protocols (e.g., Armstrong, 1965; Canter, 1971; Mosher & Smith, 1965; Rosencrans & Schaffer, 1969). Attempts to improve the Bender's discriminating power include Tolor's (1956, 1958) findings that OBD cases recall fewer Bender designs than do nonorganic patients. Hain (1964), Koppitz (1964), and Hutt (1969) have developed configurational scoring systems that have increased the Bender's capacity to discriminate between neurological and psychological dysfunctions. Lastly, Canter's (1968, 1971) Background Interference Procedure, which requires the examinee to copy the Bender designs on a sheet of paper with wavy lines, shows a great deal of promise. Nevertheless, the degree of overlap between functional and organic performances on the Bender when using present methods of analysis cautions against the use of the test as a singular, definitive measure of organicity.

Variables Influencing Bender Performance

A second line of research has focused on the effects of such variables as age, sex, intelligence, cultural background and methods of administration on Bender performance. Koppitz

(1964) provided separate norms for children under the age of 11, the age most children can be expected to reproduce all the figures without error. Rosencrans & Schaffer (1969) and Reznikoff & Olin (1957) correlated poorer Bender performance with advanced age. Bender performance does appear to be affected by extremes in age (Niebuhr & Cohen, 1956).

Experiments with the Bender have traditionally controlled for the factor of sex. Koppitz' (1964) norms for children show a different rate of expected performance for boys and girls each year to 11. Individuals of both sexes above 11 can be expected to have sufficient perceptual-motor maturity to copy the designs without error. Brilliant & Gynther (1963), Donnelly & Murphy (1974), and Tolor (1960) have found that the relationship between sex and Bender performance was negligible.

Intelligence has consistently been related to the frequency of Bender design deviations. A mental age below 11 usually involves insufficient perceptual-motor maturation to accurately copy Bender figures. Hutt (1969) described a procedure where the maturation level observed on the Bender record of a mentally defective can be divided by the chronological age and multiplied by 100 to obtain a rough estimate of intelligence. It can be used in a similar fashion with children (Wallbrown & Wallbrown, 1975; Billingslea, 1963). Adolescents and adults above the mentally defective range may be expected to copy Bender designs without error.

Cultural background has been shown to influence the

quality of Bender performance. Piexotto (1954) found a significant difference between the Bender records of five Hawaiian subcultures. Fanibanda (1973) observed that more American students accentuated the square in Figure 4, and had fewer gross distortions on Figure 2 than was observed in the records of a group of students from India. These studies have pointed to the necessity of developing separate norms for the evaluation of Bender protocols obtained from individuals of different cultural origins.

The method of administering the Bender was also found to influence performance. Gravitz & Handler (1968) gave the test to a group of 50 students who were told they were to copy 'nine' designs, and a group of 50 who were told to copy 'some' designs. Half of each group saw the stack of cards on the table and half did not. These four methods of administration affected the scoring categories of Figure Sequence, Figure Expansion and the number of pages used to complete the task. The greatest variance was observed in the group receiving the 'some-off' instructions. This supported Hutt's (1969) contention that a minimum of instructions maximizes the potential for variance between individuals. In summary, it appears that extremes in age and low intelligence adversely influence Bender performance. Protocols involving these variables must be interpreted accordingly. Results taken from individuals of different cultural backgrounds must be evaluated with caution as well. Differences due to gender are probably insignificant with adult records. Lastly, the ambiguity of the

test instructions appear to have an impact on Bender performance.

Psychodynamic Investigations of Bender Records

A third major line of research has attempted to associate some scoring factor or factors observed on Bender protocols with a personality trait or dynamic. These studies have used at least two approaches: a) attempts to ascribe an inherent meaning or typical associations to each design, or b) attempts to attribute some psychodynamic meaning to the presence or absence of a scoring deviation.

One of the first attempts to determine common associations for Bender designs was that of Suczek & Klopfer (1952). They asked college students to write down their free association to each design as it was projected on a screen in front of them. The researchers developed a set of five evaluation categories which were extrapolated from the data: a) typical associations, b) spot in the design where interest focused, c) degree of affective response elicited by the design, d) symbolic value of each design, and e) interpretive hypotheses. Also, Tolor (1957, 1960) attempted to develop a method of evaluating free associations to Bender records. In the earlier study, he asked 50 patients to respond to the Bender designs in the same way they did to the Rorschach plates. He developed six evaluation categories: a) rejection, b) neutral responses, c) descriptive responses, d) letter of the alphabet responses, e) use of part of the design for a response, and f) a response which meaningfully integrates all

parts of the design. He then provided some information about the samples' responses based on these categories. Tolor's later study used the semantic differential to determine the evaluative, potency, and activity factors for each design. His results, which showed a dissimilar pattern of descriptive adjectives for each figure, suggested that there is a unique, symbolic value for each design. Greenbaum (1955) described a procedure whereby the associations given by a patient are inserted into the Word Association List (Rapaport, Gill, & Schafer, 1975). He reported that approximately one third of the associations were fruitful. This line of research has been sparse, and has lacked theoretical consistency. However, the data obtained through these studies do provide a few tentative guidelines for interpreting figure associations.

The second line of research into the psychodynamic meaning of Bender reproductions has centered on developing a rationale for the presence or absence of a design deviation. This experimental orientation can be further divided into four subcategories: a) specific deviation research, b) evaluation of Bender performance of groups said to have a certain trait, c) factor analytic studies, and d) the development of scales and/or rationales for the psychodynamic interpretation of Bender records. These four subcategories will now be discussed in turn.

Specific deviation research. Design rotations and constriction or expansion of the copied design have been two of the design deviations receiving attention in the literature.

Griffith & Taylor (1960) reported significantly more OBD patients rotate designs than do patients with psychogenic disorders. Fuller & Chagnon (1962) found rotation to be sensitive to figure-ground disparities. Byrd (1956) found that rotation was one of the scoring factors that discriminated between a group of children judged in need of psychotherapy and a group judged well-adjusted. Hutt (1969) concluded in a review of the literature on rotation that many different factors contribute to the presence of rotation. It does not appear associated with any one dynamic.

Kitay's (1950) study of design constriction and expansion found that constricted Bender design reproductions were correlated with controlled affect as measured by the Rorschach. Increased size of the reproductions was related to uncontrolled affect. Johnson (1973) observed a positive correlation between Bender design constriction and an elevated D scale on the MMPI. Gavales & Millon (1960) failed to demonstrate a relationship between situational anxiety and the size of recalled Bender figures. Brannigan & Benowitz (1975) demonstrated a significant correlation between progressive increase of copied designs and poor emotional control in adolescents. Uneven change in figure size was also correlated with resistive and unethical behavior. In general, the research literature has been quite consistent in correlating design size deviations with the personality factor of emotionality.

Bender performance by groups with specific traits. It

was shown by Leonard (1973) that a group of patients who were judged suicidal produced more constricted design reproductions and had greater difficulty with mild rotation on Figure 2 than did a group of nonsuicidal controls. Sternberg & Levine (1965) found 88% of a group that invaded the space in Figure 5 with the vertical line of Figure 6 had suicidal ideation. However, so did 44 % of the group that did not exhibit the deviation.

Two studies investigated the performance of substance abusers on the Bender. Korin (1974) found that opiate users perseverated more than a control group. The addicts also rotated more designs, and their use of space was frequently constricted. Story (1960) made five hypotheses about how alchoholics should perform on the Bender based on his psychodynamic understanding of alchoholism. The hypotheses included a tendency to count dots (anxiety), difficulty with tangential figures (difficulty with interpersonal relationships), and the two hexagons of Figure 7 would be separated more frequently than chance (fear of homosexuality). Results substantiated these hypotheses. This study provided some construct validity for the practice of 'reading' personality traits or dynamics from Bender protocols.

Bilu & Weiss (1974) tested their configurational analysis of Bender records. They used seven scoring variables, with each variable receiving a grade of mild, moderate or severe. This approach helped to discriminate between a group of inpatient and outpatient Israelis. They found that

three of the seven scoring factors did not show the expected pattern of having more mild than moderate and more moderate than severe deviations. They also noted that certain designs were more vulnerable to deviations than others. This experimental design is notable in two ways: it used a configurational rather than a sign approach, and it attempted to account for both the presence and severity of a deviation.

Factor analytic studies. Guertin's (1952) factor analytic study of the Bender protocols taken from 100 organic and functionally disturbed patients yielded five relatively independent factors: a) poor reality contact, b) design constriction, c) inconsistent spacing, d) carelessness, and e) tendency toward curvilinear distortion. In a later study (1954a), Guertin hypothesized that poor emotional control underlies the tendency for curvilinear distortion because it occurred most frequently in catatonic records. He found five clusters of factors that accounted for most of the variance in schizophrenic records: unstable cloture, curvilinear distortion , propensity for curvilinear distortion II, fragmentation and a tendency for curvilinear movement. He related the first factor to general underlying instability, the second to impulsivity, the third to emotional disorganization, the fourth to misperceptions or attempts to avoid unpleasant feelings, and the fifth to emotional conflicts with neurotic-type defenses. Guertin (1954b, 1955) also factor analyzed the Bender records of two other samples of schizophrenics and associated personality traits to the factors he found.

Psychodynamic interpretations of Bender performance. A fourth line of research about how personality effects Bender performance has been the development of scales or patterns of design deviations that are said to implicate the presence or absence of some personality trait. This orientation has been largely represented by Hutt's work from 1945 to date. He developed two scales that are reported in his book The Hutt Adaption of the Bender Gestalt (1969). The Psychopathology Scale is used to assess the severity of functional disorders by assigning a weighted numerical value to each design deviation when it appears on a record. Hutt reported that it effectively discriminated between normal, neurotic and schizoprhrenic groups. Miller & Hutt (1975) reported a test-retest reliability over a two week period for a group of schizophrenics of .82 for females and .89 for males. Interscorer reliability was .90.

Hutt (1969) also proposed a scale that measures an individual's tendencies toward perceptual approach-avoidance, or Adience-Abience. Hutt reasoned that a highly Abient person tends to shut out or inhibit perceptual input. He speculated that this construct might be related to an individual's ability to benefit from psychotherapy. Hutt & Miller (1975) reported a test-retest reliability of .91 over a two week period. The maintenance of that level of reliability even though the scoring of the deviations changed as much as 28% lends support for a configurational approach to the interpretation of Bender protocols.

Hutt (1969, 1970) also provided his method of projectively interpreting Bender reproductions, a method he has developed over a span of 25 years in clinical practice. He has hypothesized some psychodynamic meanings for many of the deviations he defined in his system for evaluating the Bender, including signs of poor interpersonal relationships, quality of planning skills, feelings of confusion and/or inadequacy, as well as areas of internal conflict and defense mechanisms. DeCato & Wicks (1976) and Lerner (1972) have likewise proposed rationales for interpreting Bender records with respect to personality traits. Although their rationales for the interpretations are quite insightful and are based on considerable clincial observation, there has not been much, albeit supportive, research evidence on which to base these rationales.

A second problem associated with the projective use of the Bender results is that most of the studies have used group comparison statistics. Generally, there has been enough overlap between groups to make the application of the results rather tenuous for individual cases. Yet the Bender is virtually always used for diagnosing individuals. It is important to obtain some measure of the magnitude of a relationship between Bender deviations and personality traits before projective interpretations of Bender records can be made with confidence.

Present Research Problem

Hutt (1969, Ch. 5) has hypothesized that a number of

Bender design deviations are affected by anxiety. According to psychdynamic theory, anxiety signals underlying conflict and is considered a clinically important symptom. It is hypothesized that a significant correlation exists between the presence of certain Bender deviations, as defined by Hutt's system, and a self-report measure of anxiety, the State-Trait Anxiety Inventory (STAI) (Speilberger, Gorsuch, & Lushene, 1970). Just which deviations are correlated with the STAI is not known at this time. Hutt has cautioned that such a relationship might not be linear. The present study was undertaken to 1) propose a model for researching the Bender as a measure of personality, and 2) to test the model's present performance by a) determining which deviations can be correlated with anxiety, and b) finding which combinations of design deviations improve the Bender's power to predict the presence and degree of anxiety in individual cases.

Method

Patients were comprised of 14 male and 36 female clients of a Family Service Agency in Michigan. Ages varied from 18 to 51. Each patient was approached before their interview and asked to participate in an experiment that required them to copy a few geometric designs and fill out a short questionnaire. The patients were guaranteed anonymity. Each patient was individually ushered into a private room by the experimenter and given the STAI and Bender in a counterbalanced fashion. The Hutt (1969, p. 53) method for administering the Copy phase of the Bender was followed. Age and sex of each patient was marked on the protocol after the testing was completed. These, with the date of testing, served as the identifying numbers. Protocols were scored by the experimenter after all testing was completed, the Bender results first, to insure blindness of the STAI scores.

Bender results were placed on a scoring blank that was developed for the study. The sheet (see Appendix A) listed the deviations defined by Hutt along 26 rows. Nine columns across the rows provided space to mark on which design a deviation occurred. A tenth column was drawn to mark the presence or absence of each deviation in a record. An eleventh column provided a place to put a number from 1 to 4 which represented the severity of a deviation when it occurred. At the

end of each row were the definitions of each deviation's severity. Where possible, these definitions followed Hutt's idea of mild-moderate-severe, as outlined by his system. If the system did not provide a mild-moderate-severe grade for a deviation, the present experimenter modified the severity scoring on that deviation so as to obtain a three level severity grading. These modifications were based on the experimenter's experience and assumptions about how anxiety would likely influence the reproductions. The scoring blank demonstrated how often a deviation occurred and on which designs. It also provided a Deviation Total score by adding the tally (present = 1, absent = 0) in the Deviation Present/Absent column. A Deviation Severity score was obtained by summing the numbers representing the severity of the deviation (absent = 1, mild = 2, moderate = 3, severe = 4) that were put in the Deviation Severity column.

The standard edition of the Bender cards which are printed by the American Orthopsychiatric Association were used instead of Hutt's adaption of the designs, since the results would have greater applicability with the more widely used set. The measurements Hutt described for determining the deviation Abnormal Use of Space II (Hutt, 1969, p. 76) were proportionately enlarged to suit the standard edition.

The STAI was chosen because it provided a measure for State (situational) and Trait (characteristic) Anxiety in earlier samples (Joesting, 1975; Gaudry, Vagg, & Speilberger, 1975). It was anticipated that the STAI might provide infor-

mation about which deviations are most symptomatic of transient anxiety and which are associated with characteristic anxiety.

Each patient's State and Trait Anxiety score were placed on computer cards with his age and sex. The presence or absence of a deviation and it's severity score were also included. Four of the deviations (Paper Rotation, Card Rotation, Fragmentation, and Elaboration or Doodling) occurred less than three times each, so they were dropped from the analysis. The deviation Total and Deviation Severity score for each patient were included on their respective card.

The first step in the data analysis involved a X^2 performed on the number of significant correlations found between the design deviations and State and Trait Anxiety. It was realized that one could obtain a small number of significant correlations by chance alone, when computing a large number of coefficients.

The second group of statistical procedures focused on obtaining a group of deviations that would be useful in predicting anxiety from Bender performance. The first procedure was a factor analysis of the Deviation Total and Deviation Severity scales in an attempt to define clusters of deviations that might be correlated with State and/or Trait Anxiety. A second procedure attempted to develop an internally consistent scale of deviations to predict anxiety. This was done by first obtaining the 22 item-total coefficients for the Deviation Total and Deviation Severity scale. Deviations with

the highest item-total coefficients were chosen in order to delete those deviations from the subscale that contributed little to the common factor variance and subscale reliability. A gap in the ranking of item-total coefficients was observed between the fifth and sixth highest values in the Deviation Total scale. These five items served as the 'Tot 5' subscale. The ten highest item-total values in the Deviation Total scale became the 'Tot 10' subscale. The same procedure was used to select the 'Sev 4' and 'Sev 10' subscales from the Deviation Severity scale. Alpha coefficients were computed for each of the four subscales, and each was correlated with State and Trait Anxiety. A third procedure for obtaining a group of Bender deviations from which to predict anxiety was the computation of four sets of step-wise multiple regressions. The Deviation Total and Deviation Severity scales were regressed each with State and Trait Anxiety. The multiple R procedure was considered the central focus of the study.

Results

Gender was not found to be significantly correlated with either State, r = .009, Trait, r = .027, Anxiety, or with the Deviation Total, r = .124, or the Deviation Severity, r = .167, scale. Although age did not appear to influence Bender performance in this sample, it was found negatively correlated, r = -.36, with Trait Anxiety, i.e., the greater the age of the patient, the less the Trait Anxiety. Also, a substantial amount of communality, r = .64, was observed between the State and Trait Anxiety scales from the present sample.

The sample exhibited a higher degree of homogeneity with respect to Bender performance than was expected. The Deviation Total scale had a M = 10.14 and a SD of 2.17. The Deviation Severity scale showed a M = 36.76 and a SD of 3.78. Correlations were expected to be lower as a function of the small Bender variance. The State Anxiety M was 35.42 and SD was 10.98. The Trait Anxiety scale had a M of 37.98 and SD of 9.31. These were compared to two groups reported by Speilberger et al., (1970): the psychiatric group had a State Anxiety M of 47.74 and SD of 13.24, and a Trait Anxiety M of 46.62 and SD of 12.41. In contrast, their group of female college students (normals) had a State Anxiety M = 35.12 and SD = 9.25. Their Trait Anxiety M was 38.25 and SD = 9.14.

It appeared that the current sample's performance on the STAI more closely resembled the performance of a normal rather than a psychiatrically disturbed group.

The X2 results demonstrated a greater than chance, $p<001$, number of significant coefficients from the 86 correlations computed between the items on the Deviation Total and Deviation Severity scales and State and Trait Anxiety. (Abnormal Use of Space II was accidently deleted from the Deviation Total scale.) This supported the hypothesis that anxiety contributed to the occurrence of Bender deviations. As seen in Table 1, six deviations were found to be correlated, $p<.05$, with one or both of the anxiety measures. The number of correlations increased to eight when the deviations were scored for severity. However, the coefficients increased for only two of the six original deviations when scored for severity. It is likely that these fluctuations in the magnitude of the coefficients were due to chance (measurement error) rather than representing any trend. One deviation, Redrawing of Total Figure, was found to be negatively correlated with Trait Anxiety. The overall low magnitude of correlations caution against predicting anxiety from any single deviation. This finding was consistent with the failure of past research to find a Bender 'sign' to predict other traits, such as suicidal ideation or organicity.

The principle components analysis with verimax rotation of the Deviation Total and Deviation Severity scales did not produce any deviation clusters that were useful in explicating the Bender performance of the current sample. A review of the

TABLE 1

Correlations That Obtained an Acceptable Level of Significance Between Bender Deviations and the State-Trait Anxiety Measures

Deviation	r with STAI State Anxiety	r with STAI Trait Anxiety
Abnormal Use of Space I	.295*	.269*
Crossing Difficulty	.158	.263*
Curvature Difficulty	.295*	.242*
Perceptual Rotation	.302*	.342*
Simplification	.273*	.137
Redrawing of Tot. Fig.	-.048	-.255*
Items Scored for Deviation Severity		
Abnormal Use of Space I	.295*	.353*
Crossing Difficulty	.086	.246*
Curvature Difficulty	.409*	.303*
Perceptual Rotation	.283*	.297*
Simplification	.236*	.062
Redrawing of Tot. Fig.	-.009	-.224
Change in Angulation	.248*	-.034
Inconsistency in Direction of Movement	.239*	.205

*$p < .05$

correlation matrix for the Deviation Total scale found no coefficients above .31, and only 19 above .25, out of 336 correlations (Abnormal Use of Space II was accidently deleted from the analysis.) The eight weak factors were each defined by a single deviation, with the exception of the first factor. Factor 1 was defined by Deviation and Inconsistency in Direction of Movement; Factor 2 by Curvature Difficulty; Factor 3 by Collision; Factor 4 by Crossing Difficulty; Factor 5 by Abnormal Line Quality; Factor 6 by Retrogression; Factor 7 by Perceptual Rotation; and Factor 8 by Progressive Increase or Decrease in Figure Size. The analysis of the Deviation Severity scale exhibited a similar pattern of low correlations in it's matrix. It was expected that the high degree of sample homogeneity with respect to the Bender performance contributed to the low item-to-item coefficients and therefore to the absence of robust factors. This method of selecting deviations for a Bender anxiety subscale was consequently abandoned.

The alpha coefficients for the Deviation Total and Deviation Severity scales are presented in Tables 2 and 3 along with their correlations with State and Trait Anxiety. The two Bender scales appeared positively correlated with both State and Trait Anxiety, despite their poor reliabilities. This offered further support for the hypothesis that Bender performance is influenced by both situational and characteristic anxiety. The deviations selected for the subscales are also presented in Tables 2 and 3, as well as their respective alpha

TABLE 2

Bender Deviation Total Subscale

Composition and Alpha Levels

	Alpha Level	Correlations with: State Anxiety	Trait Anxiety
Deviation Total Scale	.233	.442*	.296*
'Tot 10' Subscale	.386	.356*	.184
Abnormal Sequence			
Perceptual Rotation			
Redrawing of Tot. Fig.			
Deviation in Dir. of Move.			
Inconsistent Dir. of Move.			
'Tot 5' Subscale (items also included in 'Tot 10')	.512	.181	.040
Closing Difficulty			
Curvature Difficulty			
Change in Angulation			
Retrogression			
Abnormal Line Quality			

*$p < .05$

TABLE 3

Bender Deviation Severity Subscale

Composition and Alpha Levels

	Alpha Level	Correlations with: State Anxiety	Trait Anxiety
Deviation Severity Scale	.361	.447*	.353*
'Sev 10' Subscale	.553	.443*	.327*
Abnormal Use of Space I			
Overall Incr/Decr. in Fig.			
Change in Angulation			
Retrogression			
Simplification			
Deviation in Dir. of Move.			
'Sev 4' Subscale (items also included in 'Sev 10')	.436	.418*	.358*
Abnormal Use of Space II			
Curvature Difficulty			
Inconsistent Dir. of Move.			
Abnormal Line Quality			

*$p < .05$

levels and correlations with the State and Trait Anxiety measures. The procedure of selecting items based on their item-total coefficients appeared to increase the alpha levels of the subscales in relation to the alphas obtained for the Deviation Total and Deviation Severity scales. Scoring for severity seemed to improve the internal consistency of the subscales, and therefore their correlations with the anxiety measures. The lower alpha observed in the 'Sev 4' subscale in relation to the 'Sev 10' subscale is likely due to the latter's greater length. It was noted that the 'Tot 5' subscale had a higher alpha than the 'Tot 10' or Deviation Total scales, but did not correlate with either of the anxiety measures. None of the subscales appeared to obtain a sufficient level of internal consistency or magnitude of correlation with State or Trait Anxiety to warrant their use as definitive predictors of anxiety.

The Deviation Total scale items included in the stepwise multiple regressions are presented in Table 4. The correlation obtained with the addition of each item to the list is also shown, along with it's *F* ratio. The *F* ratio is used to determine the level of confidence one may have that the addition of an item significantly improves the list's power to predict the dependent variable. The multiple *R* between the Deviation Total items and State Anxiety continued to increase through 13 items. The addition of 10 Deviation Total items significantly increased the multiple *R* with the Trait Anxiety scale. Table 5 presents the results obtained by regressing the Deviation Severity items with the State and

TABLE 4

Rate of Multiple R Increase Between Bender Deviations and State and Trait Anxiety as a Function of Adding Items

	Multiple R with State Anxiety	df	F
Perceptual Rotation	.302	1/48	4.83**
Simplification	.421	2/47	4.91**
Deviation in Dir. of Move.	.526	3/46	6.33**
Abnormal Use of Space I	.592	4/45	5.14**
Overall Incr/Decr of Figs.	.638	5/44	4.16**
Abnormal Position 1st Draw.	.667	6/43	3.01*
Curvature Difficulty	.697	7/42	3.29**
Crossing Difficulty	.728	8/41	3.85**
Retrogression	.750	9/40	2.93**
Change in Angulation	.775	10/39	3.75**
Isolated Incr/Decr of Fig.	.789	11/38	2.15*
Progressive Incr/Decr of Figs.	.803	12/37	2.32*
Abnormal Use of Margin	.818	13/36	2.81*
Abnormal Line Quality	.829	14/35	1.92
Multiple R Corrected for Sample Size	.46		

TABLE 4 (continued)

	Multiple R with State Anxiety	df	F
Perceptual Rotation	.342	1/48	6.38**
Crossing Difficulty	.372	2/47	6.39**
Abnormal Use of Space I	.538	3/46	4.29**
Curvature Difficulty	.606	4/45	5.60**
Redrawing of Tot. Fig.	.671	5/44	6.57**
Progressive Incr/Decr. of Figs.	.692	6/43	2.41*
Closing Difficulty	.715	7/42	2.80*
Perseveration	.734	8/41	2.84*
Abnormal Position 1st Draw.	.771	9/40	5.00**
Simplification	.786	10/39	2.50*
Overall Incr/Decr of Figs.	.798	11/38	1.86
Multiple R Corrected for Sample Size	.37		

*$p < .05$

**$p < .01$

TABLE 5

Rates of Multiple R Increase Between Bender Deviations Scored for Severity and State and Trait Anxiety as a Function of Adding Items

	Multiple R with State Anxiety	df	F
Curvature Difficulty	.409	1/48	9.65**
Abnormal Use of Space I	.497	2/47	5.01**
Abnormal Position 1st Draw.	.536	3/46	2.60
Simplification	.567	4/45	2.22
Perceptual Rotation	.599	5/44	2.63*
Deviation in Dir. of Move.	.637	6/43	3.36**
Collision	.672	7/42	3.50*
Abnormal Sequence	.696	8/41	2.64
Retrogression	.706	9/40	1.15
Multiple R Corrected for Sample Size	.12		

	Multiple R with Trait Anxiety	df	F
Abnormal Use of Space I	.353	1/48	6.85**
Curvature Difficulty	.458	2/47	5.10**
Crossing Difficulty	.519	3/46	3.71*
Redrawing of Tot. Fig.	.572	4/45	3.90**
Collision	.604	5/44	2.60*
Progressive Incr/Decr of Figs.	.634	6/43	2.68*

TABLE 5 (continued)

	Multiple R with Trait Anxiety	df	F
Perceptual Rotation	.665	7/42	2.99*
Change in Angulation	.689	8/43	2.60*
Overall Incr/Decr of Figs.	.708	9/42	2.13*
Closure Difficulty	.722	10/41	1.56

Multiple R Corrected for Sample Size

*$p < .05$

**$p < .01$

Trait Anxiety measures. Fewer Deviation Severity items significantly contributed to the multiple Rs with State and Trait Anxiety, nor was the magnitude of the relationship obtained as large as that found with the Deviation Total items.

Nunnally (1967) cautioned that multiple Rs are usually biased upwards in a small sample. He provided a formula for estimating the possible shrinkage of the coefficient when going from any sample size to an infinitely large sample. The multiple R between the Deviation Total scale items and State Anxiety when corrected for sample size was .46. The corrected multiple R with Trait Anxiety was .37. A corrected multiple R of .12 and .16 was obtained between the Deviation Severity and the State and Trait Anxiety measures, respectively. This does not mean that the original multiple R values would necessarily shrink that much. It does show how much the coefficients could be inflated due to sampling error.

Discussion

The step-wise multiple regression procedure selected deviations based on their ability to account for the scale variance with respect to the anxiety measures. This pre-selection of items often takes advantage of chance in that some of the correlations might be inflated through sampling error (Nunnally, 1967). The degree to which one might take advantage of chance is inversely related to sample size and the number of items from which the selection took place. The shrinkage formula employed in the study provided some estimation of how much the multiple Rs might shrink with a much larger sample. Before any confidence can be placed in the magnitude of the multiple Rs obtained in this study, it is necessary that the design be replicated with a much larger sample and the results be compared.

No significant correlation was found between Bender performance and age or sex, as was expected. It is not known why Redrawing of Total Figure was negatively correlated with Trait Anxiety. Hutt hypothesized that a second attempt to draw a design may signify the lack of anticipatory planning on the first attempt. This lack of planning may be related to the impulsive, undelayed behavior frequently associated with Character disorders, as is the noticeable relief from overt anxiety.

The infrequent occurrence of the four deviations that were deleted from the data analysis (Paper and Card Rotation, Fragmentation, and Elaboration or Doodling) may have been a result of the sampling procedures. Paper and Card Rotation have been interpreted as symptomatic of oppositional tendencies in people (Hutt, 1969). Such negativistic individuals might be expected to not volunteer for the study. The circularity of this arguement is acknowledged. Fragmentation and Elaboration or Doodling have been considered indicators of severe pathology. The present sample was selected to avoid such extremes.

Sample selection also may have been partly responsible for the homogeneous Bender performance. Since the procedure attempted to exclude the perceptual-motor dysfunctions for which the Bender designs were originally chosen, the lack of variance in the present sample could have been expected. This may be a reason for the failure of some previous research designs (e.g. Leonard, 1973, Haynes, 1970) to discriminate well between groups on just Bender results when organicity was not present.

A second probable factor contributing to the homogeneous Bender performance was the record blank used in the study. There were at least two possible shortcomings in the blank. The first was the assumption that a monotonic relationship existed between anxiety and deviation severity for all deviations. It might have been that a moderate or mild grade of a deviation on some items was indicative of greater anxiety than the severe grade, and therefore should

have received the higher weight. Summing the weighted scores, some of which could have been nonmonotonic, would have decreased the variance on the Deviation Severity scale.

The second potential source of error in the Bender record blank relates to the present experimenter's clinical judgment when assigning deviation severity weights where Hutt's system did not provide the mild-moderate-severe grades on some of the deviations. For example, the experimenter reasoned that placing the first design in the extreme upper left-hand corner of the paper constituted a moderate degree of anxiety and was given a deviation severity weight of 3. Severe Abnormal Position of First Drawing was defined by the experimenter as positioning the first design in the lower right-hand corner of the paper, possibly indicating the patient's inability to maintain conventional placement in the face of overwhelming stress. However, positioning the first drawing in the lower right-hand corner could have been a manifestation of negativism and not deserving the greater weight. The development of an empirical mild-moderate-severe grading system for those deviations not already assigned such levels is needed to insure accuracy of scoring in further studies.

The development of a scoring blank that accurately defines deviation severities and weights may not be very useful in clinical practice. However, a research form for scoring Bender records might come close to generating the interval scale quality data needed in order to apply the more powerful, advanced statistical procedures. Some of those procedures

have been modeled in the present study. It is not known if the data generated by the current scoring blank approached Interval scale quality, putting in question the appropriateness of the statistical procedures. Nevertheless, some estimation of how validly the presence of anxiety could be predicted from Bender deviations was needed and obtained. It appears that both situational and characteristic anxiety does adversely influence Bender performance. Some deviations, such as Perceptual Rotation and Curvature Difficulty, seem more affected by anxiety than others. Yet the mediocre alpha levels of the subscales, low correlations of many of the deviations with State and Trait Anxiety, and multiple Rs point out that Bender reproductions appear influenced by other variables as well as anxiety. The failure of the 'Tot 5' subscale to correlate with either of the anxiety measures despite it's alpha level attested to this. The capacity for quantifying Bender records using current systems of scoring seems too crude as yet to sufficiently discriminate between the influence of the many possible factors contributing to the deviations. Therefore, it is cautioned that Bender results be considered only a very rough means to assess an individual's level of anxiety. Whether or not a scoring system can be developed or modified which discriminates well between the organic, personality and environmental factors that influence Bender performance remains to be seen.

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Appendix A

Bender Scoring Blank

	A	1	2	3	4	5	6	7	8	P/A	S	
Abnormal Sequence												1=normal, 2=overly methodical, 3=irregular 4=confused
Abnormal Position of 1st Drawing												1=normal, 2=in middle third or upper right corner, 3=left upper corner, 4=bottom third
Abnormal Use of Space I												1=absent, 2=1 or 2 times, 3=3 or 4 or 5 times, 4=6, 7 or 8 times
Abnormal Use of Space II												1=absent, 2=1, 2 or 3 times, 3=4, 5 or 6 times, 4=7, 8 or 9 times
Collision or Collision Tendency												1=absent, 2=mild or mod. col. tend., 3=extreme col. tend. or mild col., 4=mod. or extr. col.
Abnormal Use of Margin												1=absent, 2=4 or 5 placements, 3=6 or 7 placements, 4=8 or 9 placements
Paper Rotation												1=absent, 2=1 or 2 times, 3=3 to 8 times, 4=all times
Card Rotation												1=absent, 2=1, 2 or 3 times, 3=4, 5 or 6 times, 4=7, 8 or 9 times
Overall Incr/Decr in Fig. Size												1=absent, 2=4 or 5 times, 3=6 or 7 times, 4=8 or 9 times
Progressive Incr/Decr in Fig. Size												1=absent, 2=6 figures, 3=7 or 8 figures, 4=all figures
Isolated Incr/Decr in Fig Size												1=absent, 2=1 time, 3=2 times, 4=3 times
Closing Difficulty												1=absent, 2=mild, 3=moderate, 4=severe
Crossing Difficulty												1=absent, 2=mild, 3=moderate, 4=severe
Curvature Difficulty												1=absent, 2=mild, 3=moderate, 4=severe
Change in Angulation												1=absent, 2=1 time, 3=2 or 3 times, 4=4 or 5 times
Perceptual Rotation												1=absent, 2=mild, 3=moderate, 4=severe
Retrogression												1=absent, 2=mild, 3=moderate, 4=severe

Bender Scoring Blank

	A	1	2	3	4	5	6	7	8	P/A	S	
Simplification												1=absent, 2=mild, 3=moderate, 4=severe
Fragmentation												1=absent, 2=mild, 3=moderate, 4=severe
Overlapping Difficulty												1=absent, 2=1 figure, 3=2 figures, 4=3 figures
Elaboration or Doodling												1=absent, 2=mild, 3=moderate, 4=severe
Perseveration												1=absent, 2=mild, 3=moderate, 4=severe
Redrawing of Total Figure												1=absent, 2=mild, 3=moderate, 4=severe
Deviation in Direction of Movement												1=absent, 2=1, 2 or 3 times, 3=4, 5 or 6 times, 4=7, 8 or 9 times
Inconsistency in Direction of Movement												1=absent, 2=1 change, 3=2 changes, 4=3 or more changes
Abnormal Line Quality												1=absent, 2=on 1, 2 or 3 figures, 3= on 4, 5 or 6 figures, 4= on 7, 8 or 9 figures
TOTALS:												Round off decimal to next highest whole number