# THE RELATIONSHIP BETWEEN GSR AND ANXIETY INDEXES IN PROJECTIVE DRAWINGS

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## ABSTRACT

### THE RELATIONSHIP BETWEEN GSR AND ANXIETY INDEXES IN PROJECTIVE DRAWINGS

by Leonard Handler

Ninety-six male college students drew a man, woman, and an automobile while continuous GSR's were obtained. A counterbalanced design was employed. Thus, there were six groups of 16 subjects each. The following hypotheses were investigated:

I. Drawing a man and a woman is more anxiety producing than drawing an automobile, because of the greater reflection of symbolic material.

II. Drawing a woman is more anxiety producing, followed by drawing a man, and the automobile. It was thought that the relatively well adjusted male college student would have more active problems concerning heterosexual relationships than with homosexual or homoaffectional relationships.

III. a) There is a progressive diminution of anxiety, due to the desensitization of the anxiety-producing properties of the testing session. There is less anxiety associated with drawings done second, and third, compared with drawings done first (adaptation).

b) The anxiety-producing properties of a drawing vary as a function of the six possible orders of presentation.

IV. Primary sexual characteristics are more anxiety producing than secondary sexual characteristics, which, in turn, are more anxiety producing than non-sexual body areas.

V. There is a direct relationship between the number and degree of graphic indexes of anxiety and the GSR.

VI. The various indexes of anxiety differ in terms of the magnitude of the anxiety which they reflect, from most to least, in the following order: 1. heavy pressure 2. heavy line 3. delineation line absence

4. erasure 5. light pressure 6. light line 7. small size 8. distortion 9. body simplification 10. head simplification 11. omission 12. shading 13. vertical imbalance 14. emphasis line 15. reinforcement 16. placement (upper left) 17. line discontinuity 18. large size 19. small head 20. large head 21. transparency 22. hair shading 23. head:body ratio.

Five of the six hypotheses were supported. A significant difference was found in the degree of anxiety for the man, woman, and automobile drawings for the graphic anxiety indexes, and for the two GSR measures (GSR frequency, and mean conductance). Thirteen (out of 18) of the separate indexes significantly differentiated the man and woman drawings from the automobile drawing. Thus, the automobile, as a more neutral figure, may be used as a control drawing in clinical practice.

The automobile yielded the lowest level, and the woman drawing the highest level of anxiety. There were no order differences for the GSR, but there were

order differences for five of the 23 graphic indexes. Adaptation effects were found for the two GSR measures, and for seven of the graphic anxiety indexes. For the man drawing, secondary sexual body parts yielded the greatest anxiety, followed by the sexual area, and the nonsexual body areas. For the woman drawing, the sexual body areas yielded the greatest anxiety, followed by the secondary sexual body areas, and the nonsexual body areas.

There were no significant correlations between the summed graphic indexes and the two GSR variables, but 10 of the individual indexes correlated significantly with one or both of the GSR measures. Five of the indexes correlated significantly and negatively with GSR frequency, thereby supporting previous research.

The attempt to predict the rank order of the 23 indexes in terms of how well they reflected anxiety was unsuccessful.

# THE RELATIONSHIP BETWEEN GSR AND ANXIETY INDEXES IN PROJECTIVE DRAWINGS

By

Leonard Handler

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L. H.

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# The Relationship Between GSR and Anxiety Indexes in Projective Drawings

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Clinical experience continues to yield abundant support for the contention that the drawing of the human figure often symbolizes important aspects of the drawer's personality; however, the rules for determining the symbol-referent relations are as yet imperfectly understood. There exists a number of reservations concerning the propositions upon which figure drawing analysis rests.

Swensen's (1957) review of the literature concludes that research does not support the validity of Machover's indexes of anxiety; however, a recent study by Handler and Reyher (1964) supports the validity of a number of anxiety indexes. The authors had 57 male college students draw a male, female, and an automobile

under stress and nonstress conditions. A previous study (Handler, 1963) indicated that there was no significant difference in task difficulty between drawing an automobile and drawing a male. External stress was shown to increase manifestations of anxiety on the DAP; fifteen of the 21 hypothesized indexes of anxiety significantly differentiated the stress from the nonstress drawings for the male figure, while eleven indexes significantly differentiated between the female stress and nonstress drawings. Only five of 17 indexes significantly differentiated between the stress and nonstress drawings for the automobile, thereby supporting the hypothesis of the relative neutrality of the automobile drawing. The decreasing frequency in the number of significant indexes for the male, female, and automobile drawings was taken as evidence for a symbolic intrapsychic source of anxiety in addition to the external stress situation. A number of indexes discussed by Swensen (1957) were significant, but in the opposite direction. That is, there was more shading, hair shading, erasure, reinforcement, emphasis line, and placement

in the upper left hand corner of the page in the non-stress situation. These opposite findings were explained in terms of adaptiveness, flexibility, and an appropriate reaction to a reality situation.

The present study is an extension of the study by Handler and Reyher (1964); its purpose is to relate presumed graphic indexes of anxiety to a physiological measure of arousal and anxiety. The following hypotheses were investigated:

I. Drawing a man and a woman is more anxiety producing than drawing an automobile, because of the greater reflection of symbolic material.

II. Drawing a woman is more anxiety producing, followed by drawing a man, and an automobile. It was thought that the relatively well adjusted male college student would have more active problems concerning heterosexual relationships than with homosexual or homoaffectional relationships.

III. a) There is a progressive diminution of anxiety, due to the desensitization of anxiety-producing properties of the testing session. There is

less anxiety associated with drawings done second, and third, compared with drawings done first.

b) The anxiety-producing properties of a drawing vary as a function of the six possible orders of presentation.

IV. Primary sexual characteristics are more anxiety producing than secondary sexual characteristics, which, in turn, are more anxiety producing than nonsexual body areas.

V. There is a direct relationship between the number and degree of graphic indexes of anxiety, and the GSR.

VI. The various indexes of anxiety differ in terms of the magnitude of the anxiety which they reflect, from most, to least effective, in the following order: 1. heavy pressure 2. heavy line 3. delineation line absence 4. erasure 5. light pressure 6. light line 7. small size 8. distortion 9. body simplification 10. head simplification 11. omission 12. shading 13. vertical imbalance 14. emphasis line 15. re-inforcement 16. placement (upper left) 17. line

discontinuity 18. large size 19. small head 20. large head 21. transparency 22. hair shading 23. head:body ratio. This rank ordering is based in part on previous research (Handler & Reyher, 1964), and, in part, on a review of the literature.

## Method

The sample consisted of 96 male college students, selected from introductory psychology classes. A Grass Model #5 Polygraph was employed to record the GSR data. The drawings were made on sheets of 8-1/2 x 11 unlined paper attached to a clipboard, which in turn was fastened to one of the arms of a chair.

The subject was seated in a chair with double armrests, with his back to the polygraph. The electrodes were attached to the fingers of the nonpreferred hand, and at least fifteen minutes were then allowed for skin hydration under the electrodes, and for general adaptation. Yellow Springs Instrument Company electrodes and electrode paste were employed. During the adaptation period the subject was told that he would be asked to

make a series of drawings on the first sheet of paper, and thereafter, he would be asked to make separate drawings on separate sheets of paper, with one drawing per page. He was also told that a freshly sharpened pencil would be used for each drawing, and that the experimenter would supply a new pencil before each drawing was to be done.

The polygraph was started as soon as the electrodes were attached, and operated continuously throughout the testing session. A GSR baseline was established for each subject. The experimenter then said, "Let's begin!" The result was invariably a large reaction, and additional time was required for the subject's skin resistance to return as closely as possible to the original level. The subject was then told, "In a little while I'm going to ask you to write your first name." A short period of time was allowed for GSR activity to subside, and the subject was then told, "Write your first name." This same procedure was followed for the subject's middle and last names. In a similar

manner the subject was requested to draw a circle, square, rectangle, diamond, star, pentagon, hexagon, and an octagon. After this, time was allowed for the subject's resistance level to return to the original prestimulus level. He was then told, "In a little while I'm going to ask you to draw a man (or woman, or automobile)." The order of the drawing requests was counterbalanced. Thus, there were six possible orders, with 16 subjects in each of the six groups. As the subject drew, the experimenter recorded the areas drawn, directly on the polygraph paper. The result was a record of the reaction which corresponded to the drawing of a particular area of the body, or of the automobile. After each of the three drawings was completed, the subject's resistance level was again allowed to return as closely as possible to the original prestimulus level.

GSR Measures

There has been a great deal of controversy over the years concerning which of the many GSR measures is

the most appropriate, and most reflects anxiety and tension (Block, 1962; Speisman, Osborn & Lazarus, 1961). Therefore, the measures below were chosen because: 1. They are the measures that have been employed frequently and successfully in the past. 2. The measures supplement each other in terms of the kinds of information they yield. The measures employed were: 1. GSR Frequency (number of GSR's divided by the time taken for each drawing). 2. Mean Conductance (the mean of readings taken at the beginning, middle, and at the end of a drawing). The GSR frequency provides information about the anxiety-producing properties of specific body parts. The mean conductance measure yields information concerning the overall anxiety-producing properties of each drawing.

Scoring

All drawings were first coded and were then scored for the 23 anxiety indexes, one index at a time. The drawings were scored for degree of presence or absence of each index, using a modified and extended

version of the Hoyt-Baron scoring manual (Hoyt & Baron, 1959). This is essentially the same scoring manual used in a previous study (Handler & Reyher, 1964).

Score values usually ranging from zero to three were assigned. Handler and Reyher (1964) reported that the percentage of agreement between two raters, scoring 90 drawings for degree of presence of each index, ranged from .67 to 1.0, with a model score of .87. As a further reliability check, the experimenter had an additional rater, one who was unacquainted with the hypotheses of the study, score 33 drawings for degree of presence of each index. The rater scored 15 of the indexes. The remainder of the indexes were scored with mechanical devices,--e.g. a ruler was used for size and head size, and a grid was used to score placement. Reliabilities were therefore not computed for these measures. The percentage of agreement between the rater and the experimenter ranged from .67 to .97, with a median score of .87. The reliabilities, comparable to those reported by Hoyt and Baron (1959), Mogar (1962), and by Handler and Reyher (1964), demonstrate that the indexes can be scored with a high degree of reliability.

## Results

### Hypothesis I: Graphic Anxiety Indexes

The scores for the 23 indexes were summed for each subject, for each drawing. Hypothesis I was tested by comparing the summed scores for each of the three drawings, using an analysis of variance test for repeated measures on independent groups (Edwards, 1950). In this analysis, the test of significance for orders one to six is based upon independent, randomly assigned subjects, whereas the test of significance for drawings, and for the interaction between drawings and orders is based upon the same subjects. Thus, two separate error terms for the tests of significance are used: one for the possibly correlated data obtained from the same subjects, and one for the data obtained from the independent groups of subjects. Table I presents the results for the drawings. An $F$ of 131.80

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Insert Table I about here

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was obtained, which is significant far beyond the .01

level of confidence. The results indicate that there is definitely a significant difference in the degree of anxiety reflected in the three drawings. Hypothesis I was thereby supported for the graphic indexes.

Significance tests were also done for each of the 23 separate indexes, using the analysis of variance method of Link and Wallace (Mosteller & Bush, 1954). This test uses ranges as a measure of variation instead of sums of squares. A significance test was provided for drawings, and for orders. The results for each index are presented in Table 2. Only the table for

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Insert Table 2 about here

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the .05 level of significance was available; accordingly, only significance values of .05 or less were reported. Fifteen out of 18 indexes differentiated the three drawings beyond the .05 level of significance. The remaining five indexes referred only to the human figures. For the 15 indexes, heavy line, and heavy pressure had highest anxiety scores for the automobile. For the

remaining 12 indexes, the automobile drawings had the lowest anxiety scores.

Hypothesis I: GSR Data

The GSR data were analyzed with the same analysis of variance technique used for the graphic anxiety indexes analysis. Table 3 summarizes the results for the frequency measure. The F value of 20.0 for drawings

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Insert Table 3 about here

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was significant beyond the .01 level. Table 4 summarizes the results for the mean conductance scores. Similar results were obtained for the conductance

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Insert Table 4 about here

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measure. Again, a significant F of 16.67 for drawings was obtained, indicating that the mean conductance for the three drawings was significantly different. The results for the frequency and conductance data thereby support Hypothesis I.

Hypothesis II: Graphic Anxiety Indexes

As hypothesized, an examination of the means for the three drawings indicated that the woman drawing had the highest anxiety scores, while the automobile had the lowest scores. The mean anxiety scores for the woman, man, and automobile drawings were 19.4, 18.8, and 12.9, respectively. Duncan's New Multiple Range Test (Edwards, 1960) was used to determine which of the three means differed significantly from each other. The results indicated that both the man and woman drawings were significantly different from the automobile drawing, beyond the .001 level of significance; however, the man drawing only differed from the woman drawing at the .10 level of significance.

Hypothesis II: GSR Data

The woman drawing had the highest GSR frequency and the highest mean conductance, while the automobile had the lowest values for both of these measures. Duncan's New Multiple Range Test (Edwards, 1960) was used to determine which of the three means differed significantly from each other. For the frequency measure the

results indicated that the man, woman, and automobile drawings were all significantly different from each other at the .001 level of confidence. For the conductance measure the man drawing was significantly different from the automobile drawing at the .005 level, while the woman drawing was significantly different from the automobile drawing at the .001 level. The conductance for the man drawing was significantly lower than the conductance for the woman drawing at the .01 level. The results for the frequency and conductance measures thereby support Hypothesis II.

Hypothesis III: Graphic Anxiety Indexes

Order. The *F* of .790 for orders was nonsignificant, indicating that there were no significant differences between the six orders of presentation. Separate analyses were also done for each of the separate indexes, using the Link-Wallace test.

In the Link-Wallace test for order, there are six possible orders being compared (MAW, MWA, WAM, WMA, AWM, AMW), one with another. Thus, it is possible

to determine which, if any, of the six orders within each index is significantly different from the others, in terms of the degree of anxiety reflected.

The results are presented in Table 2. Five of the graphic anxiety indexes (heavy pressure, balance, erasure, head:body ratio, and small head size) were significant for differences between the six orders of presentation. For the significant orders within each of these five indexes it makes a difference, in terms of the degree of anxiety present, as to the sequence in which the three drawings are executed. For these five indexes there were 21 separate order differences out of a possible 75. For example, for the index "balance," order WAM yielded significantly higher anxiety scores than order AWM.

For the 21 significant order differences, the number of times a specific order yielded higher anxiety scores (when compared with the scores for another possible order) was compared with the number of times that order yielded lower scores, using a two tailed sign test. None of the differences were significant, except

for orders WAM and AWM. Order WAM had significantly more high anxiety scores than low anxiety scores (p= .002), while order AWM had significantly more low scores than high scores (p=.008). Of the orders which had the higher anxiety scores, 12 of the 21 had woman as the first drawing, eight had man as the first drawing, while only one had automobile as the first drawing. The corresponding values for the lower anxiety scores were eight, seven, and six, respectively. A chi square of 9.1 for these values is significant at beyond the .02 level.

The results for the above two analyses tend to indicate that for the five indexes sensitive to differences between the six orders, the highest level of anxiety occurs when the woman drawing is first, while the lowest level of anxiety occurs when the automobile drawing is first. Thus, while the hypothesis for order (IIIb) was not supported for the summed graphic anxiety indexes, it was supported in part for five of the individual indexes.

Adaptation. The drawing x order interaction obtained in the analysis of variance for the summed

graphic anxiety indexes was used to test for adaptation. Table I summarizes the results of this analysis. The drawing x order interaction indicates whether or not there is any difference in the degree of anxiety represented in a drawing when it is done either first, second, or third. An *F* of 1.36 was obtained, which is nonsignificant. Thus, the hypothesis for adaptation (IIIa) was not supported for the summed graphic anxiety indexes. However, an examination of the scores for each index suggested that for some indexes the three orders (first, second, and third) were associated with an increase in the amount of anxiety, while for other indexes there was a decrease for order. Thus, in computing a pooled anxiety score for each subject these opposite effects may very well have cancelled each other out. It was therefore decided to investigate adaptation effects separately for each index. To do this, the data were recast into a 3x3 table, where the rows, as before, referred to drawings (man, woman, or automobile), but the columns now referred to the order in which the drawing was done (first, second, or third). With the

data set up in this way, it is possible to investigate, for each of the indexes, whether there is any difference in the amount of anxiety when a drawing was done either first, second, or third. The results may be seen in Table 2. It should be noted that the general conception of adaptation can mean either an increase or a decrease, depending upon the particular function being discussed.

Seven indexes yielded significant differences for the effects of adaptation (progressive diminution or reduction in the level of anxiety when a drawing is done first, second,or third). These indexes are: erasure, emphasis line, shading, reinforcement, large head size, head simplification, and hair shading. As Table 2 indicates, five of these indexes showed an increase as a function of whether the drawings were done first, second, or third, while one index showed a decrease.[1] Hair shading showed an increase for order two, followed by a decrease for order three. The results for the individual indexes therefore support the hypothesis concerning adaptation (IIIa).

## Hypothesis III: GSR Data

Order. Table 3 presents the results for the frequency data, while Table 4 presents the results for the conductance measure. An *F* of 1.62 was obtained for the frequency data, and and *F* of .591 was obtained for the conductance measure. Both values are nonsignificant, indicating that there is no difference in GSR frequency, or in mean conductance level for the six different orders of presentation. The hypothesis for order (IIIb) was therefore not supported for the two GSR measures.

Adaptation. The drawing x order interactions obtained in the analysis of variance for GSR frequency, and for mean conductance were used to test for adaptation. Table 3 summarizes the results for frequency, while Table 4 summarizes the results for conductance. An *F* of 4.0 was obtained for frequency, which is significant beyond the .05 level. An *F* of 9.22 was obtained for conductance, which is significant beyond the .01 level. Greater GSR frequency, and higher conductance levels (both indicating increased arousal), were

associated with the drawing done first, while lower conductance levels and decreased GSR frequency were associated with drawings done second, and with drawings done third. Thus, the hypothesis for adaptation (IIIa) was supported for the two GSR measures.

Hypothesis IV

The median GSR amplitude was obtained for each body part, for each man and each woman drawing. The number of times the GSR for each body part fell above or below the median was then determined. The chi square one sample test was used to test the significance of the differences for the various body areas. Table 5 lists the body parts for the man and woman drawings, with their associated levels of significance.

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Insert Table 5 about here

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For the man drawing, three body parts (shoulders, chest, and hips had significantly more GSR's above the median, indicating increased arousal. Another body area (feet) had significantly more GSR's below the median.

For the woman drawing, eight body parts (genital area, breast area, waist, skirt, hips, hair, body contour, and arms) had significantly more GSR's above the median.

The body parts were then classified as either sexual, secondary sexual, or nonsexual. The basis for categorization was mainly in terms of anatomical and physiological criteria. For the man drawing the sexual body area was defined as that area within the waist, hip, and groin region. Thus, the body parts included in this category were: genital area, waist, and hips. The secondary sexual area included the following body parts: beard, chest hair, shoulders, chest, and hair. The nonsexual body area included: arms, neck, facial features, hands, fingers, feet, and toes.

For the woman drawing the sexual body area was defined as for the man drawing, with the exception of body parts included in the breast area. Thus, for the woman drawing the sexual body area included: the genital area, waist, skirt area, hips, and breast area. The secondary sexual body parts included the hair, the body contour, and the legs. The nonsexual area

included the shoulders, arms, neck, facial features, hands, fingers, feet, and toes.

The number of subjects the preponderance of whose GSR's to sexual, secondary sexual, and nonsexual body areas were above and below the median was tabulated. The percentage of subjects above and below the median for the man drawing was as follows: sexual, 66% above, and 34% below the median; secondary sexual, 71% above, and 28% below the median; nonsexual, 55% above, and 45% below the median. For the woman drawing, 82% of the subjects gave GSR's above the median for sexual body areas, and 18% gave GSR's below the median. Seventy-five percent of the cases were above the median, and 25% below the median for the secondary sexual body areas. The corresponding values for the nonsexual areas were 58% and 42%, respectively.

A chi square for single samples was used to test the significance of the scores above and below the median. The results for the man drawing indicated that there was no significant difference between the frequencies above and below the median for the nonsexual body parts (chi

square=.74, p=between .05 and .3). However, significantly more subjects gave GSR's above the median than below the median for the sexual area (chi square=6.4, p=between .01 and .001), and for the secondary sexual body area (chi square=11.60, p=<.001). Thus, for the man drawing the secondary sexual body areas seem most anxiety-arousing, followed by the sexual body area, and lastly, the nonsexual body areas.

Similar results were obtained for the woman drawing, except that the sexual body areas were associated with the most anxiety (chi square=30.4, p=<.001), followed by the secondary sexual body areas (chi square =13.2, p=<.001). As with the man drawing, there was no significant difference between the frequency above and below the median for the nonsexual body parts (chi square =1.77, p=between .2 and .1). Thus, Hypothesis IV was supported for the woman drawing, and to a lesser degree, for the man drawing.

Hypothesis V

Pearson Product Moment Correlations were run between the summed graphic anxiety indexes scores for the

96 subjects and the frequency and conductance measures, for the man, woman, and automobile drawings. The results, presented in Table 6, indicate that the correlations are not essentially different from zero.

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Insert Table 6 about here

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The correlation between the graphic indexes and the conductance measure for the automobile was .18, which approaches significance (p=.08). Thus, using the summed indexes, Hypothesis V is not supported for the man and woman drawings, but there is a small indication of support for Hypothesis V for the automobile drawing.

Separate Product Moment Correlations were done for each index and the two GSR measures, since it is possible that pooling the 23 graphic indexes obscured relationships between individual anxiety indexes and the GSR variables. The results are presented in Table 6. All of the resulting correlations were rather low, but 12 correlations were significant at the .05 level and beyond, while three were significant at beyond

the .01 level. For the man drawing, shading, erasure, reinforcement, emphasis line, and distortion correlated with GSR frequency. Four of these indexes (shading, erasure, reinforcement, and emphasis line) correlated significantly and negatively with GSR frequency. This finding is similar to Handler and Reyher's (1964) findings for shading, erasure, reinforcement, and emphasis line. There were no significant correlations for any of the indexes and the conductance measure for the man drawing. For the woman drawing significant correlations were obtained for the frequency measure and reinforcement, heavy line, emphasis line, body simplification, and light pressure. Emphasis line, light pressure, and reinforcement were significantly and negatively correlated with GSR frequency. Shading, hair shading, and erasure were also negatively correlated with GSR frequency for the woman drawing, but the correlations were nonsignificant. Two indexes (line discontinuity, and emphasis line), correlated significantly with the conductance measure for the woman drawing. For the automobile drawing only placement correlated with GSR

frequency, while line discontinuity and emphasis line were significantly correlated with the conductance measure. Thus, the results for the separate indexes tend to support Hypothesis V.

The GSR frequency correlations for shading, hair shading, erasure, reinforcement, and emphasis line were consistently negatively correlated, indicating that presence of these indexes is associated with significantly fewer GSR's.

Hypothesis VI

The correlation for each index with each of the GSR measures may be seen in Table 6. Rank order correlations were done for the obtained correlations between each of the two GSR variables and the rank order suggested in Hypothesis VI. Separate correlations were done for each drawing. The obtained correlations for the man drawing were .20 for GSR frequency, and -.08 for the conductance measure. The respective correlations for the woman drawing were .25 and .17, respectively, and those for the automobile drawing were .20 and .07, respectively. None

of these correlations is significantly different from zero. These results indicate that there is essentially a zero relationship between the hypothesized rank order of the anxiety indexes and the obtained rank order for GSR frequency, and for mean conductance. Hypothesis VI was therefore not supported.

## Discussion

### Hypothesis I

The finding that more anxiety is associated with the man and woman drawings than with the automobile drawing is in agreement with Handler and Reyher's (1964) findings. They found that the figures reflected more graphic anxiety signs than did the automobile drawing. These results suggest that as a more neutral stimulus, the automobile is a useful control figure in clinical practice, as was indicated by Handler and Reyher (1964), and Reyher (1959).

The results for the separate indexes are also similar to Handler and Reyher's (1964) findings. The

major difference is more apparent than real. That is, in the results obtained for Hypothesis I (see Table 2), four of the five indexes that were significant in the opposite direction (present in the nonstress drawings more frequently) in the previous study were nonsignificant in the present study. These indexes were: shading, erasure, reinforcement, and emphasis line. A possible explanation for the diverse findings in the two studies lies in procedural differences for the two experiments. In the former study, drawings were obtained both under stress and nonstress conditions, and each stress drawing was compared with its nonstress counterpart. In the present study, the drawings were obtained only under stress conditions, and the man, woman, and automobile drawings were compared with each other. Thus, it is possible that in the present study stress washed out differences between the three drawings for shading, erasure, reinforcement, and emphasis line. This conclusion may be especially true if these above indexes are more sensitive to external stress than to intrapsychic stress.

To determine whether the external stress actually did wash out differences between the three drawings for erasure, shading, reinforcement, and emphasis line, the scores for these indexes were compared with the stress and nonstress scores in the previous study (Handler & Reyher, 1964), using the Link-Wallace method of analysis of variance. For erasure and emphasis line, the scores for drawings in the present study, and the scores for the stress situation in the previous study were significantly different from the nonstress scores of the previous study at beyond the .05 level of confidence. The scores for erasure, and emphasis line in the present study were not significantly different from the stress drawings in the former study. For shading, the corresponding scores were significantly different from each other, beyond the .05 level, although the drawings of the present study were more similar to the stress drawings of the former study than they were to the nonstress drawings. There were no significant differences for reinforcement. These findings suggest that for erasure, emphasis line, and to some extent

shading, the hypothesis concerning the washing out of differences, mentioned above, is correct.

Handler and Reyher (1964) found that there was more shading, hair shading, erasure, emphasis line, and reinforcement in the nonstress rather than in the stress drawings. They suggest that these indexes might reflect an adaptive and flexible response, rather than indicating anxiety. The present findings for adaptation are consistent with this argument. Table 2 indicates that erasure, shading, emphasis line, reinforcement, hair shading, large head size, and head simplification showed adaptation, and furthermore, that with adaptation there was increased rather than decreased presence of these indexes, for all but head simplification. The consistent negative correlations obtained for shading, hair shading, erasure, reinforcement, and emphasis line indicate the same trend. Absence rather than presence of these indexes correlates negatively with GSR frequency. It is very likely that these indexes are more sensitive to external stress (albeit in the opposite direction) than to intrapsychic stress.

Thus, they may be less reliable indexes of symbolic conflict than those indexes which differentiated between the three drawings. In addition, it is also possible that those indexes which differentiated all three nonstress drawings from their stress counterparts in the study by Handler and Reyher (1964), and differentiated between the three drawings in the present study, reflect both intraphsychic and external stress. These indexes were: line pressure increase, delineation line absence, and body simplification. This conclusion is based on the fact that in the present study the above three indexes differentiated between the three drawings despite the external stress, and in the previous study they differentiated between stress and nonstress for the three drawings.

In the present study, the automobile had the lowest anxiety scores for all but two of the significant indexes (heavy line, and heavy pressure), which is as it should be, since the automobile has been shown to be a more neutral control figure. For heavy line, and line pressure increase the automobile had significantly higher scores than did the figures. At first

glance these findings suggest that heavy line and heavy pressure denote the absence of anxiety. However, another interpretation is that heavy line and heavy pressure reflect external stress to a greater degree than they reflect intrapsychic stress. On the other hand, light line and light pressure both differentiated between the three drawings, but these indexes are present in the figures significantly more than in the automobile drawing. Thus, a differential response to stress is suggested for these four indexes, light line and light pressure reflecting intrapsychic stress, while heavy line and heavy pressure seem to reflect external stress. Similar results for light and heavy line were found in the previous study. The data are also consistent with the results of Reznikoff and Nicholas (1958), and with those of Gutman (1952). Reznikoff and Nicholas (1958) found that heavy line significantly differentiated the drawings of paranoid schizophrenics from undifferentiated schizophrenics. A paranoid typically views the world about him as a source of his fears, rather than recognizing his own intrapsychic conflicts. Gutman (1952) found that patients who did not improve in therapy tended

to draw continuous and reinforced lines, but those who improved tended to draw light, sketchy lines. This is consistent with the widely shared view among therapists that patients who experience anxiety about themselves improve more quickly than those who see their problems as emanating from an outside source.

The above discussion concerning intrapsychic and external sources of stress suggests that the presence of anxiety indexes in a drawing cannot always be used to measure intrapsychic stress. Instead, the presence of shading, erasure, emphasis line, reinforcement, heavy line, heavy pressure, and to a lesser extent delineation line absence and body simplification, may be a reaction to an external source of stress.

Hypothesis II

Significant results for Hypothesis II indicates that the female drawing, drawn by a male is fraught with more anxiety than is either the man or the automobile drawing, and that the man drawing is more anxiety producing than the automobile drawing. Additional data for support of Hypothesis II is indicated in the results for

order for the graphic indexes. For the indexes sensitive to differences between the six orders, the highest level of anxiety occurred when the woman was drawn first, while the lowest level of anxiety occurred when the automobile drawing was first.

The finding that the woman drawing yielded the highest level of anxiety is important in establishing a baseline for clinical interpretation in a diagnostic setting, since it seems that the presence of anxiety indexes in a woman drawing drawn by a male might be a natural state of affairs. Thus, it may be erroneous for a clinician to weave elaborate hypotheses about a patient's relationships with, and feelings toward women on the basis of anxiety indexes in the female drawing unless he takes into account the fact that normal males, too, have a certain degree of anxiety associated with their drawings of a woman. It is possible that older males, whose natural adolescent problem concerning masculinity and sex have been dealt with and solved will not show such anxiety indexes in their drawings of a woman. Additional research along these

lines is indicated. It is conceivable that DAP norms can be established for a variety of age groups, and for both sexes, much like norms on the various intelligence scales.

Hypothesis III

It is not very surprising to find adaptation with the GSR, for it is a well known and well documented phenomenon (Woodworth & Schlosberg, 1954). Such adaptation effects seem to be another indication that the GSR measures are probably tapping reactions to external stress. However, it is quite surprising to find adaptation effects for seven of the individual graphic anxiety indexes. Such findings indicate that shading, hair shading, erasure, reinforcement, emphasis line, head simplification, and large head size may be unreliable indexes of anxiety unless adaptation effects are taken into account. If these indexes are used to infer anxiety, the order of drawing must be taken into account, since the first drawing might differ from the second and third in degree of anxiety reflected merely because

it was drawn first. For example, if a clinician obtains two or more drawings from a patient, and the second drawing has a good deal more shading, erasure, reinforcement, and emphasis line than the first drawing, it would be erroneous to conclude that the content of the second drawing was associated with more anxiety for the patient than the first drawing. Such results would be expected on the basis of adaptation, and for these indexes, adaptation is associated with increased rather than decreased presence. Similarly, the second drawing might show less head simplification, and a smaller size head than the first drawing, since for these two indexes adaptation is manifested by decreased rather than increased presence.

The findings for adaptation seem to indicate that the subject or patient is adjusting to a new anxiety provoking task, or to the stresses of the testing situation. Thus, differences in the pattern of the adaptation effect can often be diagnostically significant. That is, it may be possible for the clinician to use the adaptation effect as a measure of whether the patient is beginning to relax and as a measure of whether or not rapport has

been established. If a patient's drawings do not show adaptation effects, the examiner might do well to speculate about his interaction with the patient, and about the quality of rapport established. If there seems to be no problems in this area, one can then be more certain that it is the task of drawing itself which is the cause of the anxiety. The particular content of the second or third drawing might be associated with more conflict than was the first drawing. The use of the automobile as a control figure, as suggested by Handler and Reyher (1964), would be valuable here in sorting out the anxiety responses to external stress and associated adaptation from intrapsychic stress associated with the content of the drawing.

The six different orders of presentation do not appear to influence degree of anxiety, as measured by the two GSR variables. There does seem to be some effect of order for the graphic indexes, but these differences seem to depend mainly upon whether the woman drawing is done first, or whether the automobile is done first.

Hypothesis IV

The results for Hypothesis IV are consistent with observations of adolescents, and with what is known about the sexual problems associated with maturation. The results indicate that although adolescent males are concerned with both sexual and secondary sexual signs, they are more consciously concerned with secondary sexual signs,--signs that are more public and transmittable evidence of masculinity, sexuality, and adequacy, than they are with male primary sexuality, per se. Mussen, Conger, and Kagan (1963) note that for the adolescent, possession of desirable physical characteristics is associated with physical attractiveness. They emphasize that members of the Western culture equate certain anatomical attributes with strength or weakness, and with sexual attractiveness or unattractiveness, and that the adolescent equates his ability to establish satisfying heterosexual relationships with aspects of his physique. Mussen, Conger, and Kagan (1963) emphasize that the American boy is concerned

with his height, breadth of his chest and shoulders, muscular development, and amount of facial and bodily hair. When adolescent boys were asked about the kinds of bodily changes they wanted, they wished for broader shoulders, more rugged builds, large chests and facial and body hair (Frazier & Lisonbee, 1950).

When a male draws a female, however, it is the sexual areas which are more anxiety arousing rather than the secondary sexual areas, although the secondary sexual areas are also highly anxiety producing. Here again it seems that the relative newness of the sexual drive is an anxiety arousing problem for the adolescent male. Moreover, he is more interested in her primary sexual characteristics, and more troubled over the problems and fears accompanying this interest.

For many subjects there seemed to be specific sexual or secondary sexual body areas associated with greater GSR amplitude. Perhaps this is analogous to the colloquial conception of "a breast man," "a leg man," etc. It may well be that for each male, different

secondary sexual body areas of the female represent sexuality to a greater or to a lesser degree.

The demonstration of such variability from person to person may be viewed by some as indicating that the DAP is too capricious and unreliable. However, the results for Hypotheses I, II, III, and IV indicate that there is a great deal of consistency among subjects despite the variability. More important, such variability is the essence of what is meant by "projection" in the context of projective testing.

Hypothesis V

The lack of correlation between the summed anxiety indexes and the GSR measures seems to be due to pooling the indexes which correlate negatively with the GSR, together with those indexes which correlate positively with the GSR measures. The fact that the correlations for the individual indexes are low may very well be due to the fact that the GSR measures seem to be tapping external stress moreso than intrapsychic stress, while the graphic indexes probably tap

both external stress and intrapsychic conflicts on a symbolic level. Others (Mordkoff, 1964; Speisman, Lazarus, Davison, & Mordkoff, 1964) have found rather high correlations between GSR variables and stress. The stress situations described by these authors seem to a great extent external rather than intrapsychic. Preliminary findings by Reyher also bear upon this point. Using the technique of Free Imagery while continuous GSR's were being recorded, Reyher noted that there were few GSR's when the material was unconsciously but symbolically expressed.[2] In another study involving hypnotically implanted conflicts, more direct recognition of the conflict in the posthypnotic state resulted in increased GSR frequency.[3]

The tendency toward significance for the correlation between the automobile and the conductance measure must be seen in light of the results for Hypotheses I and II. That is, for the summed graphic anxiety indexes, and for the two GSR measures the figures had significantly higher scores, indicating greater anxiety and conflict, while the automobile drawing had the lowest scores,

indicating the least amount of anxiety. Thus, the correlation between the graphic indexes and the conductance measure indicates that they both reflect a generally lowered level of anxiety. This finding is consistent with the rest of the data, and seems to indicate the failure of the conductance measure to reflect anxiety.

The significant negative correlations obtained for the GSR frequency and shading, hair shading, erasure, reinforcement, and emphasis line are in agreement with the results for Hypothesis I. Again, it seems that the presence of these indexes is associated with significantly fewer GSR's.

Increased distortion, increase in omission, and increased placement in the upper left hand corner are associated with increased GSR frequency for the man drawing. They are very likely good measures of external stress if one takes the viewpoint that GSR frequency reflects external stress to a greater degree than it reflects symbolic, intrapsychic stress. The same may be said of heavy line and body simplification

for the woman drawing. The significant negative correlation between light pressure and GSR frequency for the woman drawing is inconsistent with the rest of the data. Therefore, it was decided to compare the rankings of the correlations obtained for the man drawing and the frequency measure with the correlations for the woman drawing with the frequency measure. A rank order correlation of .66 was obtained, which indicates that the overall results for the man and woman drawings are rather similar. This correlation indicates that the rankings for each of the indexes is similar for both drawings, and that the results for the 23 indexes can be generalized to both drawings.

As the results of this investigation show, conductance and GSR frequency are equally good measures when comparing a stresser operating over time--i.e., comparing GSR frequency and conductance for each of the three drawings. However, Table 6 shows that GSR frequency enters into more significant relationships than conductance. This finding indicates the superiority of the GSR frequency measure in reflecting more

specific sources of anxiety, for a more differential analysis.

Hypothesis VI

The attempt to predict the best anxiety indexes, in terms of rank order, was a failure, in part because of the obtained negative correlations. In terms of postdiction, however, everything is not lost. It seems that shading, hair shading, erasure, reinforcement, and emphasis line are good anxiety indexes, as are distortion, body simplification, and heavy line, and to a lesser extent, placement, and omission. These indexes seem valuable for predicting external stress rather than for predicting intrapsychic stress, however. If one takes the view that the GSR primarily taps external stress, then the data for Hypothesis VI yields no information concerning the best indexes of intrapsychic stress. The fact that shading, erasure, reinforcement, and emphasis line did not significantly differentiate the automobile from the figure drawings, and the fact that the differences between the three drawings were

washed out by the stress indicates that these indexes are poor predictors of intrapsychic stress. On the other hand, those indexes which differentiated between the three drawings despite the external stress situation (see Table 2) should prove to be good indexes of intrapsychic stress. Some additional research along these lines seems indicated. However, the results in Table 2 seem in agreement with a review of the literature concerning DAP anxiety indexes (Handler, 1963). When the significant results for the indexes in Table 2 were compared with the summarized results for 48 studies, only five of the 15 significant indexes (light line, hair shading, placement, transparency, and head:body ratio) yielded results which were inconsistent with the review of the literature. That is, significant results in the present study agreed with other findings for these indexes. There were relatively few studies, for these 15 significant indexes, which yielded nonsignificant results. Only two out of eight indexes which yielded nonsignificant results in the present study (head simplification, and large size) were inconsistent with

the review of the literature. The results for the other six indexes (shading, erasure, reinforcement, emphasis line, small head size, and large head size) were essentially in agreement with the summarized review of the literature.

It should be emphasized that although this study has dealt with a list of anxiety indexes, the author does not advocate a one to one sign approach, or any figure drawing analysis approach which attempts to reduce analysis to a simple formula. Such an approach seems quite empty and misleading. However, this does not mean that one must swing in the opposite direction and resort solely to an intuitive, impressionistic approach. Rather, the ideal approach seems to be one which allows for the full use of a clinician's skill, based on intuition, hunch, or what have you, within a scientific framework of controls, and checks and balances. There is no harm in generating many hypotheses about a patient from his drawings, just so long as these are logically and systematically checked out.

The omnipresent split in clinical psychology between "the artist," and "the scientist" seems nowhere to make less sense than in the task of figure drawing analysis.

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## Footnotes

[1]While an increase with order hardly looks like adaptation, data presented by Handler and Reyher (1964) indicate that the increased presence of some anxiety indexes demonstrates lowered anxiety and adaptation to stress. This point will be discussed more fully later in this paper.

[2]J. Reyher, Personal communication, Michigan State University, 1964.

[3]J. Reyher, Personal communication. Michigan State University, 1964.

Table 1

Analysis of Variance for the Summed Anxiety Indexes

| Source | SS | df | MS | F |
|---|---|---|---|---|
| Between Orders | 141.17 | 5 | 28.23 | .790 |
| Between Subjects | 3213.71 | 90 | 35.71 | |
| Total Between | | (95) | | |
| Between Drawings | 2550.58 | 2 | 1275.19 | 131.80* |
| Drawings X Order | 96.75 | 10 | 9.68 | 1.36 |
| Subjects X Drawings | 1276.67 | 180 | 7.09 | |
| Total Within | | (192) | | |
| Total | | (287) | | |

*$p<.01$.

Table 2

Results for Drawing Differences, Order Differences, and for Adaptation, for Each of the 23 Indexes

| Anxiety Index | Drawing Signif. | Direction[a] | Order Signif. | Adaption Signif. |
|---|---|---|---|---|
| Heavy Line | Yes | A most | No | No |
| Light Line | Yes | A least | No | No |
| Heavy Pressure | Yes | A most | Yes | No |
| Light Pressure | Yes | A least | No | No |
| Shading | No | | No | Yes[b] |
| Hair Shading | Yes | W more | No | Yes[b] |
| Erasure | No | | Yes | Yes[b] |
| Placement | Yes | A least | No | No |
| Reinforcement | No | | No | Yes[b] |
| Emphasis Line | No | | No | Yes[b] |
| Vertical Imbalance | Yes | A least | Yes | No |
| Delineation Line Absence | Yes | A least | No | No |
| Line Discontinuity | Yes | A least | No | No |
| Transparency | Yes | A least | No | No |
| Omission | Yes | A least | No | No |

(Table continued on next page)

Table 2 (continued)

| Anxiety Index | Drawing Signif. | Direction[a] | Order Signif. | Adaption Signif. |
|---|---|---|---|---|
| Distortion | Yes | A least | No | No |
| Head Simplification | No | | No | Yes[c] |
| Body Simplification | Yes | A least | No | No |
| Size (Small) | Yes | A least | No | No |
| Size (Large) | No | | No | No |
| Head Size (Small) | No | | Yes | No |
| Head Size (Large) | No | | No | Yes[b,c] |
| Head:Body Ratio | Yes | W most | Yes | No |

Note.--All significance values are reported as .05 or less.

[a]W = woman; A = automobile.

[b]Increase with order.

[c]Decrease with order.

Table 3

Analysis of Variance for GSR Frequency

| Source | SS | df | MS | F |
|---|---|---|---|---|
| Between Orders | .0354 | 5 | .0071 | 1.62 |
| Between Subjects | .3920 | 90 | .0044 | |
| Total Between | | (95) | | |
| Between Drawings | .0240 | 2 | .0120 | 20.0** |
| Drawings X Order | .0243 | 10 | .0024 | 4.0* |
| Subjects X Drawings | .1158 | 180 | .0006 | |
| Total Within | | (192) | | |
| Total | | (287) | | |

*p<.05.

**p<.01.

Table 4

Analysis of Variance for the Mean Conductance Scores

| Source | SS | df | MS | F |
|---|---|---|---|---|
| Between Orders | 318 | 5 | 63.6 | .591 |
| Between Subjects | 9686 | 90 | 107.6 | |
| Total Between | | (95) | | |
| Between Drawings | 60 | 2 | 30.0 | 16.67* |
| Drawings X Order | 166 | 10 | 16.6 | 9.22* |
| Subjects X Drawings | 317 | 180 | 1.8 | |
| Total Within | | (192) | | |
| Total | | (287) | | |

*$p < .01$.

Table 5

Frequency of Scores Above and Below the Median for Body Areas, and Their Associated Significance

| Man | | Woman | |
|---|---|---|---|
| Body Area | Chi Square | Body Area | Chi Square |
| Genital Area | NS | Genital Area | <.05[b] |
| Hips | <.001[b] | Breast Area | <.001[b] |
| Waist | NS | Waist | <.01[b] |
| Beard | NS | Skirt Area | <.001[b] |
| Shoulders | <.01[c] | Hips | <.05[b] |
| Chest | <.001[c] | Body Contour | <.001[c] |
| Chest Hair | NS | Hair | <.001[c] |
| Arms | NS | Legs | NS |
| Neck | NS | Shoulders | NS |
| Facial Features | NS | Arms | <.02[d] |
| Hair | NS | Neck | NS |
| Hands, Fingers | NS | Facial Features | NS |
| Feet, Toes | <.05[a,d] | Hands, Fingers | NS |
| | | Feet, Toes | NS |

[a]Significantly more GSR's below the median.

[b]Sexual area.

[c]Secondary sexual area.

[d]Nonsexual area.

Table 6

Pearson Product Moment Correlations Between the 23 Indexes, GSR and Mean Conductance

| | Man | | Woman | | Automobile | |
|---|---|---|---|---|---|---|
| Index | Freq. | Cond. | Freq. | Cond. | Freq. | Cond. |
| Pooled Anxiety Indexes | .05 | .03 | -.08 | .05 | .01 | .18[a] |
| Shading | -.23[c] | .07 | -.13 | -.10 | -.18[a] | .07 |
| Hair Shading | -.18[a] | .00 | -.13 | -.15 | --- | --- |
| Erasure | -.21[c] | -.05 | -.16 | .09 | -.18[a] | .15 |
| Reinforcement | -.24[c] | -.06 | -.37[d] | -.02 | -.07 | .06 |
| Light Line | -.04 | .02 | -.16 | .15 | -.02 | -.02 |
| Heavy Line | .10 | -.05 | .23[c] | -.12 | .15 | .02 |
| Placement | .19[b] | -.12 | .00 | .05 | .20[c] | -.18[a] |
| Omission | .19[b] | .10 | .03 | .01 | .11 | .12 |
| Line Discontinuity | -.16 | .17 | -.11 | .26[c] | -.16 | .21[c] |
| Size | .10 | -.10 | .00 | .03 | .00 | -.07 |
| Emphasis Line | -.21 | .13 | -.33[d] | .21[c] | -.13 | .21[c] |
| Large Size | -.08 | .04 | .09 | -.08 | .06 | -.04 |
| Head:Body Ratio | .11 | -.04 | .09 | -.15 | --- | --- |

(Table continued on next page)

Table 6 (continued)

| | Man | | Woman | | Automobile | |
|---|---|---|---|---|---|---|
| Index | Freq. | Cond. | Freq. | Cond. | Freq. | Cond. |
| Head Length | .09 | -.09 | -.04 | .15 | --- | --- |
| Large Head | -.02 | -.07 | .08 | -.06 | --- | --- |
| Transparency | .04 | -.07 | .00 | -.08 | -.07 | -.10 |
| Distortion | .22[c] | .03 | .13 | -.14 | .05 | -.01 |
| Delineation Line | .05 | .02 | .16 | -.03 | .12 | .07 |
| Vertical Imbalance | .13 | .08 | .11 | .03 | .05 | .01 |
| Head Simplification | .05 | -.17 | .15 | -.05 | --- | --- |
| Body Simplification | .15 | -.07 | .23[c] | -.09 | -.03 | .10 |
| Light Pressure | -.03 | .04 | -.23[c] | .00 | -.04 | -.05 |
| Heavy Pressure | .01 | -.06 | .15 | .02 | .03 | .17 |

[a] $p=.08$.

[b] $p=.06$.

[c] $p=.05$.

[d] $p=.01$.