

Shading in the H-T-P: Its Relationship to Situationally  
Specific Anxiety and Other Variables in a Male  
and Female Canadian University Sample

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Thesis presented to the School of Graduate  
Studies of the University of Ottawa in partial  
fulfillment of the requirements for the degree  
of Doctor of Philosophy in Clinical Psychology.



Ottawa, Canada, 1975

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## ACKNOWLEDGEMENTS

This thesis was prepared under the direction of Professor Gilles Chagnon, former Acting Director of the Clinical-Counselling Programme of the Faculty of Psychology of the University of Ottawa. The writer would like to express appreciation for his guidance in this project.

Gratitude is also expressed to Dr. Dan Lee for his statistical advice and encouragement, and to Dr. Charles McInnis for the extended loan of his personal Ph.D. thesis copy.

Appreciation is likewise expressed to Mr. Herb Taylor, Manager, Applications Department of the University of Ottawa's Computing Centre for his assistance, and that of his helpful staff in the data analysis phase of this research. Special thanks go to Mrs. Ann Hurd, Mr. Brian Beaton, and Mr. Gordon Fluger.

Finally, the writer would like to acknowledge Miss Pat Herlehy, who helped this endeavor in her own special way.

### Curriculum Studiorum

Eugene D. Shershen, was born February 27, 1945, in Wanamie, Pennsylvania. He received the Bachelor of Arts degree in Psychology from Bloomsburg State College, Bloomsburg, Pennsylvania, in 1967. His Master of Arts degree in Clinical Psychology was granted by Xavier University, Cincinnati, Ohio, in 1971. The title of his thesis was An Experimental Approach to the Problem of Shading in the H-T-P Projective Drawing Technique.

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## INTRODUCTION

Ever since the origin of projective personality assessment, most formal techniques have contained a category for shading which has been given various meanings and interpretations. Shading has been related with depression, emotional control, sensitivity, and intelligence. However, the most usual meaning given to shading has been that of anxiety.

Although these interpretations are equally applicable to the general area of projective drawings, they have particular significance in the H-T-P Technique. Its broad object categories (i.e., House, Tree, and Person) furnish ample opportunity for a wide range of projective meanings and clinical interpretations. However, it is the posited relationship between anxiety and shading in the H-T-P which has been most developed by its originator. It was this hypothesized relationship about the meaning of shading in the H-T-P with which this study was primarily concerned.

Most clinicians have generally followed Buck's (1948, 1966) proposed interpretations of shading in the H-T-P, yet research has not been able to support these views. In light of the discrepancy between the clinical use of shading in the H-T-P and research findings, this study was designed to help bridge this gap.

This research not only considered the anxiety interpretation of shading in drawings with an approach that had not yet been thoroughly explored, but it also examined the differential use of shading by males and females.

Furthermore, this research explored an alternate motivational interpretation of shading in drawings which, it was hoped, would possibly explain some of the sex differences in the use of shading, as well as a few of the other conflicting findings in the literature on shadings.

Finally, this research attempted to develop a scale of the Quality of Shading, which should greatly help further research on the psychological bases of shading in projective drawings.

Chapter I presents a review of the literature relevant to shading in projective drawings and to situationally specific anxiety. Chapter I culminates in the statement of the hypotheses, which were derived from the literature reviewed, the assumptions formulated, and the theoretical rationale which was proposed.

Chapter II presents the research design and describes the psychometric instruments used in the study. Chapter III reports the results of the tests of the hypotheses, as well as the results of all subsequent statistical analyses. Finally, Chapter IV discusses the implications of the results of this study in light of previous research and further suggests additional areas of research on shading in the H-T-P.

## Chapter I

### REVIEW OF THE LITERATURE

This chapter first presents a review of the literature specifically concerned with shading in the H-T-P Technique. Following this section is the review of studies dealing with shading in human figure drawings. The last section of the review deals with research concerning the concept of situationally specific anxiety.

#### Review of Shading in the H-T-P

Although there are studies which have found no significant relationship between anxiety and shading as used in the House-Tree-Person (H-T-P) Technique (Buck, 1948; 1966), clinicians continue to interpret shading in a projective drawing test as a sign of anxiety (Buck & Hammer, 1969; Hammer, 1958). Not only is a gross use of shading considered indicative of generalized anxiety, but depending upon the location of the shading in the drawing, inferences are made concerning specific areas of conflict.

Buck (1948) similarly viewed line quality as a further index of anxiety. He held that heavy black lines drawn throughout a given whole by a person not afflicted with a central nervous disorder, may be indicative of a "generalized tension" (p.63). He further stated that a specific detail presented in this manner, with heavy black lines, may indicate a conflict either with the drawn item or with what it represents.

In his H-T-P manual, Buck (1948) made a distinction between "healthy" shading and "unhealthy" shading. Healthy shading, he stated, is used to show details by implication. He added, it "is produced quickly; is drawn without heavy strokes; and is not returned to" (p.61). In contrast, unhealthy shading is characterized by a longer production time, forceful strokes, and a compulsive reinforcement of the area.

Other researchers (Jolles, 1952; Kinget, 1952; Machover, 1951; Urban, 1963) dealing with the projective drawing techniques likewise regarded shading as indicative of anxiety. Machover (1951), who also differentiated qualitative aspects of shading, stated that "shading may be random and feverish in its release of psycho-motor tension, or it may be more rationalized, designed, and socially sublimated" (p.352). Furthermore, Kinget (1952) distinguished between light and dark shading. She stated that "shading evidences a predominantly emotional personality make-up, tending toward passionateness when it is dark, toward sensitivity when it is light" (p.95).

From these statements it could be inferred that there are at least two different qualitative types of shading--a rationalized, sensitive type and a random, passionate type. In effect, these types appear to be Buck's (1948) healthy and unhealthy shading. From the above discussion, it could also be assumed that the use of the former type of shading suggests an intelligent awareness of one's environment and the latter an indication of anxiety.

Interestingly, other techniques of projective personality assessment similarly give the interpretation of anxiety to certain shading responses. This claim has been particularly evident for the Rorschach and was extensively dealt with by Piotrowski (1957).

All of the foregoing discussion gives some credibility for the anxiety interpretation of shading and support to Buck's distinction of the shading response; yet, empirical evidence is lacking for this anxiety interpretation of shading in the H-T-P Technique. Perkinson (1956), taking shading as a whole, failed to find a significant correlation with anxiety, but found a positive relationship between shading and intelligence. A modified replication study by Bieliauskas and Clarke (1965) revealed no relationship between shading and intelligence, but stated a confirmation of Perkinson's finding of no relationship between shading and general anxiety.

On the basis of this previous research, Shershen (1971) investigated the relationships between shading in the H-T-P, intelligence, and both general and test anxiety. Forty volunteer subjects (college students) of both sexes were preselected for either high or low anxiety with the IPAT anxiety scale (Cattell & Scheier, 1963) and placed in four equal anxiety-sex groupings (i.e., HM, HF, LM, and LF). Subjects were then individually administered the H-T-P, the Otis S-A, and the Sarason Test Anxiety Questionnaire (TAQ; Mandler & Sarason, 1952). In quantifying shading, judges independently rated all drawings for both

Degree and Quality ("healthy" or "unhealthy") of Shading according to Buck's (1948) criteria. Results concerning the Degree of Shading ratings showed a sex difference, rather than an anxiety difference--overall males shaded more than females. The correlations between Degree of Shading and anxiety (both general and test anxiety), as well as with intelligence, were all nonsignificant; however, the direction of the shading scores were surprising. Males, on the average, tended to increase shading with increasing anxiety, but females showed the converse--i.e., low-anxiety females shaded more than high-anxiety females. These results confirmed Bie-liauskas and Clarke's (1965) findings of no relationship between shading and general anxiety or intelligence, and partially those of Perkinson (1956)--i.e., of no relationship between shading and anxiety. The judgments of the Quality of Shading were generally similar to the Degree ratings, but the correspondence was not perfect. It seemed as if the raters were judging a lesser Degree of Shading as being "healthier".

It is, however, the finding of a sex difference between males and females on the Degree of Shading category which was felt by the researcher to be most significant. In previous literature, shading had been assumed to be an undifferentiated characteristic of drawings--i.e., used in the same manner by either sex. Yet, with this difference in use by males and females, speculation was raised as to a differential meaning of shading for each sex.

In a modified replication of Shershen's (1971) study on the H-T-P, Berger (Note 1) confirmed the finding of a sex difference between males and females on the Degree of Shading. Using a sample of 60 male and 51 female college students in a group administration, he found that males shaded significantly more than females, but the direction of shading, although not significant, was inverse to that found by Shershen (1971). Berger's females increased in shading from low to high anxiety, whereas his males shaded in a minimally inverse direction. Since Berger used a middle anxiety group, his results showed that the moderate-anxiety subjects of both sexes, shaded less than either the low-or high-anxiety subjects of the same sex. Correlations (Pearson  $r$ 's) between shading and general anxiety (IPAT), shading and intelligence, and anxiety and intelligence were all nonsignificant. In addition to supporting Shershen's (1971) finding of a sex difference on the Degree of Shading, these results further confirmed those of Bieliauskas and Clarke (1965)--of no relationship between shading and anxiety--and likewise, failed to confirm Perkinson's (1956) finding of a significant positive relationship between shading and intelligence on the H-T-P.

The only other empirical literature specifically dealing with the H-T-P and relevant to this topic is a series of studies by Marzolf and Kirchner (1970, 1971, 1972), using a subject pool of 850 college students of both sexes. Although not specifically stated in their reports, the data for all three studies were obtained from this original sample

(Kirchner, Note 2). Differences between the number of subjects in the first and last study were due to attribution of those who did not complete all tests. In the testing procedure, all original subjects were administered the H-T-P in a group and subsequently (4-6 weeks later) most completed the Sixteen Personality Factor Questionnaire (16PF), which was only used in the later analyses.

In their first study, Marzolf and Kirchner (1970) used 393 males and 457 females in an attempt to establish "normative" and reliability data for 73 drawing characteristics which they concluded were important in literature dealing with the H-T-P. The specified variables were scored as either present or absent. Shading was among these variables and was defined as consisting of "any penciling other than that of the outline, except hair on the person" (p.139). Hair shading was rated as a separate characteristic.

Although not specifically reported, the consistency of the presence or absence of shading for a test-retest sample was apparently between 65.8 to 95.9% for all three drawings. However, the most important result for this study was the finding of a significant sex difference on the shading characteristic. From the presentation of their tabled data, it could be observed that in this sample, the presence of shading was greater in the drawings of females, but that this difference was significant only for the Shading of House item, 62.3 vs. 70.9%,  $p < .01$ .

The main purpose of Marzolf and Kirchner's (1971) second study was to determine if drawing in color affected the consistency with which the 73 characteristics are present or absent in the H-T-P, as well

as to determine if differences in consistency are related to personality traits measured by the 16PF.

The researchers used two samples of college students, which were administered on the same day, both the Achromatic H-T-P and the 16PF. From 4 to 6 weeks later, Sample A (Achromatic) consisting of 49 males and 87 females, made a second set of H-T-P drawings in pencil. After a like interval, Sample C (Chromatic), comprised of 146 males and 152 females, made their second drawings with crayons. In effect, test-retest reliability was being measured for the Achromatic sample. The authors reported that the incidence of characteristics between the first drawings (in pencil) of both Samples A and C was significantly different on only one characteristic for males, and on only three characteristics for females. Apparently the Incidence of Shading was not significantly different between the initial pencil drawings of Samples A and C. However, on the second drawings of both samples, reliable differences in Incidence of Shading occurred not only between males and females in the Achromatic and the Chromatic samples, but also between males and females within, the Achromatic and Chromatic mediums-- i.e., sex differences emerged from the first to second drawing task.

Of the characteristics showing reliable differences between the second drawings of the Achromatic- and Chromatic samples, shading was the largest. In fact, the greatest difference was an increase of 32.6% for the Shading of House item by males on the Chromatic second drawing. On the other shading items (Tree and Person) for males, the amount of increase was comparable; but for females, only the increase in the Shading of Person item,

approximated those for the males. Nevertheless, the females also showed significant increases on the other two items (Shading of House and Shading of Tree). In other words, the findings suggested that both males and females show the presence of shading to a greater extent on chromatic second drawings, but that males show a greater overall increase.

Marzolf and Kirchner (1971) stated that "according to Buck, drawing in color places additional pressure upon the S and provides evidence for his tolerance and control of emotion-producing stimuli" (p.504). Furthermore, they indicated that Buck hypothesized that shading was more likely to be present in color drawings. Based upon their data, the authors conceded support for the affect of Buck's color-arousal hypothesis on the increased presence of shading in chromatic drawings.

Extrapolating from these findings, it would seem that one could hypothesize that the presence or absence of shading is a drawing characteristic affected by "emotion-producing stimuli" (i.e., drawing in color)--but differentially for each sex. However, in examining this data further, females showed a greater Incidence of Shading in both the Achromatic and Chromatic second drawings (significant in Shading of Tree and Shading of Person). Therefore, just in doing the task of a second drawing, males and females are different in their use of shading.

For more complete information, it would have been better if Marzolf and Kirchner (1971) had reported the difference between the presence of shading on the first and second drawings (both Achromatic and Chromatic) for both sexes within each of these samples. It could not be ascertained without statistical tests, whether the differences found on the

second drawings were not due to initial base-rate differences in shading between males and females on the first drawing (Achromatic). If data is cited from the original, larger sample (Marzolf & Kirchner, 1970), then it can be observed that from the first to the second drawings (Achromatic), males decreased the Incidence of Shading on all three shading items (Shading of House, Shading of Tree, and Shading of Person), whereas females generally increased the presence of shading on all items except Shading of Person, where it was only slightly less than significant.

Although these data were not tested, they suggested two possible interpretations, based upon differing assumptions about shading in drawings. First, if it were assumed that the presence of shading in a drawing is an indicator of anxiety, then it could be hypothesized that the same second drawing task for males is less anxiety-provoking than the first. In other words, they readily adapt to the second task. However, if the second drawing task is in color, then it is a new situation which increases their anxiety to an even higher level.

On the other hand, the reaction of females from the first achromatic drawing task to the second was, in general, opposite. Females showed an initially higher level of anxiety than males on the first achromatic drawing task, and subsequently further increased in anxiety. This would seem to imply that, for females, doing the same second drawing task is more anxiety provoking. However, when the second drawing task is in color, it has an anxiety-arousing effect, but it is not of the same magnitude as the effect which occurs in males. Therefore, this differential stimulus value, could

possibly be due to the initial difference in anxiety level between males and females as reflected by the presence of shading in their drawings.

On the contrary, although the preceding conjecture is a plausible explanation of the sex difference found by Marzolf and Kirchner (1970) in Incidence of Shading in H-T-P drawings, an alternate interpretation could be based upon the assumption that the presence of shading in a drawing is an indicator of involvement in the drawing task. Since the presence of shading in a drawing is a nonessential characteristic which may be considered an embellishment in a drawing, the use of shading would seem to indicate higher motivation to produce a better quality drawing. The presence of more shading, up to a point, usually contributes to the overall drawing quality (Harris, 1963). In short, this motivational interpretation of shading in drawings suggested a possible explanation for some of the sex differences found in the shading variable, i.e., males and females may show different motivational levels when requested to complete a drawing task.

Therefore, it appeared that the H-T-P drawing task is somehow different for males and females. The preceding studies cited have presented evidence for this case; however, another study published by Marzolf and Kirchner (1972) produced further enlightenment on this matter of a differential male-female use of shading.

In their last article, Marzolf and Kirchner (1972) were interested in determining the validity of the relationship in incidence of 108 (original 73, plus 35 additional) drawing characteristics to personality

traits as measured by the 16PF. From their sample of 306 males and 454 females, they concluded that their most notable finding was "marked sex differences in characteristic-trait relationships" (p.148). This finding was particularly true with regard to the shading characteristic. For females, the Shading of House item, occurring on 71.0% of their drawings, was significantly related to being emotionally stable (Factor C: Affected by feelings - Emotionally stable;  $r = -.12$ ,  $p < .005$ ). However, for males the Shading of House item, in 64.1% of their drawings, was related to being imaginative (Factor M: Practical - Imaginative;  $r = -.12$ ,  $p < .02$ ). These findings appear to indicate that the use of shading by males and females has different psychological bases.

In a further statistical analysis with multiple regression, no other traits beside Factor M: Practical - Imaginative, were related to the use of shading by males; however, for females, and  $R$  of .21,  $p < .005$ , indicated that the Shading of House item could be better predicted in combination with other traits. Females who were Emotionally stable, Suspicious, Forthright, and troubled by Undisciplined self-conflict were more likely to show Shading of the House. However, a discriminant function analysis, indicating the relative contributions of each 16PF trait factor, only increased prediction 7.5% over knowing just the first factor.

If the presence of shading were interpreted with a motivational point of view, then it could be concluded that males show less initial involvement in an achromatic drawing task than females. Furthermore, from the

first achromatic drawing task to the second, males further decrease their involvement as indicated by the Incidence of Shading. In other words, they tend to get bored more easily by the same, second task. However, when the second drawing task is new or different (e.g., in color), then males increase their involvement to a greater extent. Females, on the other hand, initially invest more effort into a first, achromatic drawing task than males, and on the same second (achromatic) drawing task, further increase their motivation to embellish their drawings with shading. In other words, they put forth a greater effort to make their drawings better by shading. Nonetheless, if the second drawing task is in color, then they also respond to this new task with increased involvement. However, because they were already at a high level of involvement for the initial achromatic drawing task, the amount of increase in Incidence of Shading would necessarily be limited, or at least dependent upon, their initial level. Therefore, without Marzolf and Kirchner (1971) having reported the results of a test of difference in Incidence of Shading between the first and second drawings of each sex, a definite conclusion cannot be made concerning Buck's color-arousal hypothesis for the presence of shading. Instead, the differential effects of achromatic vs. chromatic drawings could have been due to a different initial base rate in the use of shading by males and females, or to the order of the drawing task. Bieliauskas and Heffron (1960) reported that when quantitative H-T-P scores are used as the criteria, the first drawing task completed (chromatic or achromatic) yields the higher score. Furthermore, Heffron-Royal (1956) found that females generally attained higher quantita-

tive H-T-P scores. Establishing achromatic-chromatic base rates and sex-differences in the shading response was felt important in clarifying the relationship between shading and anxiety.

According to the authors (Marzolf & Kirchner, 1972), the personality factors related to shading in drawings of the House by females was a rather "peculiar mixture" (p.161). However, they stated that this finding may have been a consequence of the fact that they "noted only the presence of shading and not the quantity and quality of shading, as suggested by Buck (1966, p. 83)" (p.161). Marzolf and Kirchner (1972), in concluding the results of their findings, stated a confirmation of the existence of low but reliable relationships between certain H-T-P drawing characteristics and measured personality traits. Furthermore, they reiterated that the meaning of a drawing characteristic seemed to vary with sex and that such a meaning may be related to a personality trait in a nonlinear manner.

These findings of Marzolf and Kirchner's (1970, 1971, 1972) indicate a sex difference for the meaning of shading in the H-T-P, yet they do not appear to be congruent with those of Shershen (1971) and Berger (Note 1). Whereas Marzolf and Kirchner (1970, 1972) reported that females generally displayed the incidence of shading more often than males, Shershen (1971) and Berger (Note 1) found that males shaded to a greater degree than did females. The difference in these results probably lies in the methods of rating shading, i.e., dichotomous vs. continuous ratings.

Whereas Marzolf and Kirchner just recorded the presence or absence of shading in all their studies, both Shershen (1971) and Berger (Note 1) had judges rate the Degree (amount and intensity) of Shading. As well, Shershen (1971) attempted to differentiate the Quality of Shading. It is entirely possible that although females may display more Incidence of Shading in their H-T-P drawings, males may produce a greater overall Degree. Therefore, these apparent contradictions were explored in this research, using all three categories of rating shading, i.e., Incidence, Degree, and Quality.

With these results, the literature directly relevant to shading in the H-T-P Technique is concluded. Findings of the major studies in this area have been reported. However, in order to do justice to research on such an important variables as shading in a projective drawing task, it was necessary to search into the literature dealing with human figure drawings.

Summary. Since the development of projective personality assessment techniques, the category of shading has been of considerable interest and importance. The most usual interpretations given to shading has been that of anxiety or intelligence, or both. Of particular concern to this research was the meaning given to shading in the H-T-P Technique.

The characteristic of shading in the H-T-P has been well elaborated by its originator, John Buck (1948). He specifically differentiated shading into two basic types--"healthy" and "unhealthy" shading. He implied that the use of "healthy" shading indicates intelligence, but stated that the use of "unhealthy" shading was an indication

of anxiety. Other contributors (Jolles, 1952; Kinget, 1952; Machover, 1951; Urban, 1963) to the area of projective drawing techniques, and practicing clinicians, have generally followed Buck's proposed interpretations of shading in the H-T-P, yet research has been unable to support these views.

Perkinson (1956), taking shading as a whole, failed to find a significant correlation with anxiety, but found a significant positive relationship between shading and intelligence. A modified replication study by Bieliauskas and Clarke (1965) found no relationship between shading and intelligence, but stated a confirmation of Perkinson's finding of no relationship between shading and anxiety.

On the basis of this previous research, Shershen (1971) investigated the relationship between Degree of Shading on the H-T-P and both general and test anxiety--as well as its relationship with intelligence. Results showed a sex difference rather than an anxiety difference between groups-- males shaded significantly more than females. Correlations between Degree of Shading and anxiety (both general and test anxiety), as well as that with intelligence, were all nonsignificant. The unpredicted sex difference in Degree of Shading response was confirmed by Berger's (Note 1) research on a much larger sample. Similarly, his correlations between Degree of Shading and general anxiety and Degree of Shading and intelligence were all nonsignificant.

Further findings of sex differences in drawing characteristics in general were reported in three articles on the H-T-P by Marzolf and Kirchner (1970, 1971, 1972). Although only rated for Incidence (presence

or absence) of Shading, their findings had particular relevance for this research. In their first study, Marzolf and Kirchner (1970) found that females showed more Incidence of Shading than males, but the difference was significant only for the Shading of House item. Their second study (Marzolf & Kirchner, 1971), which attempted to determine the effect of drawing in color on 73 drawing characteristics, shed considerable light on male-female shading response differences. When subjects were requested (after 4 to 6 weeks) to produce a second set of H-T-P drawings in color, both males and females significantly increased the presence of shading in their drawings. However, when another sample of subjects was requested (after the same period of time) to produce the second H-T-P drawing task in pencil, females still significantly increased the presence of shading in their drawings, whereas males decreased their Incidence of Shading.

If shading in drawings were assumed to be indicating anxiety, then these male-female differences in Incidence of Shading would probably be reflecting differences in anxiety reaction patterns, i.e., differences in situational adaptation. It could be said that females display more anxiety than males on a first drawing task, and on a second drawing task, significantly increase in anxiety. Males, on the other hand, show a decrease in anxiety from the first to second drawing task; but, if the second drawing task is produced in color, they likewise show a significant increase in anxiety.

However, if the presence of shading in a drawing were assumed to be an indicator of involvement in the drawing task reflecting interest, then it can be hypothesized that males and females display different motivational levels when requested to complete a second drawing task. In other words, females try to embellish their second drawings, whereas males are not

interested in the same second drawing task. But if the second drawings are produced in colors, the males are stimulated by the "new" task and thus show more involvement as reflected by their increased shading.

Both interpretations are plausible explanations for Marzolf and Kirchner's (1970, 1971) findings and were felt important in clarifying the meaning of shading in the H-T-P. Marzolf and Kirchner (1972) further stressed the importance of considering sex differences in order to understand the meaning of a drawing characteristic, as well as the importance of measuring the quantity (degree) and quality of shading. Apparent contradictions between results of different studies were assumed to occur because of different methods of rating shading and for the other reasons stated above.

#### Review of Shading in Human Figure Drawings

Although called by various names (Draw-A-Man, Draw-A-Woman, Draw-A-Person), drawings of the human figure have been used for psychological purposes for quite some time. In North America person drawings were given a great impetus when Florence Goodenough developed her Draw-A-Man (DAM) Test as a measure of intellectual maturity (Goodenough, 1926). Harris (1963) further improved upon the use of this instrument for measuring intelligence. However, following Goodenough's suggestion for further use of the DAM, Machover (1949) developed the Draw-A-Person (DAP) Test as a projective measure of personality characteristics. Both of these tests are rather widely used (Lubin, Wallis, & Paine, 1971; Sundberg, 1961) and have generated much research, but particularly the latter.

Of relevance for this review was the reporting by Goodenough (1926)--which was later confirmed by Harris (1963)--of sex differences in the drawings of boys and girls. These differences were reflected in particular drawing characteristics as well as in the finding that the scores for girls were generally higher than those obtained by boys. Goodenough did not mention shading specifically in her book, but Harris indicated that shading is used to score "bonus" points on the higher quality drawings of older children. Thus, Harris implied that shading enhances the quality of a drawing and that it is related to intelligence.

Machover (1951), as previously reported in the H-T-P review, differentiated at least two types of shading, but seems to have placed more emphasis on shading as an indicator of anxiety. More recently Machover was cited by Johnson (1971b) as suggesting a further differentiation of shading into specific types. Nevertheless, most research on shading in the DAP has attempted to relate shading with anxiety or pathology.

Several comprehensive reviews of human-figure drawing research have been published on studies reported between 1949-67 (Roback, 1968; Swensen, 1957, 1968). Based on the fact that some studies ( 4 ) found shading positively related to anxiety, others ( 5 ) found it related negatively, and still others ( 10 ) found shading not related to anxiety at all, these reviewers concluded that the findings in this area are indefinite. However, Handler and Reyher (1965) in a review specifically concerned with anxiety indices in projective drawings, concluded that in general, research upholds the validity of a number of drawing indices as predictors of anxiety.

Specifically in regard to shading, Handler and Reyher (1965) stated that "the number of studies (4) in agreement with traditional clinical interpretation is balanced by an equal or greater number of findings in the opposite direction (5), and an equal or greater number of non-significant findings (10)" (p.307). They suggested that shading alone may be poor measure of Machover's traditional anxiety interpretation and elaborated an alternative explanation which they mentioned in a previous study (Handler & Reyher, 1964). The conflicting findings were explained by them as being the result of the manner in which subjects react to stress-- i.e., whether they avoid or cope with stress. They made the observation that under the stress of the drawing task and/or laboratory situation, some individuals exerted a minimal amount of effort in drawing and desired to leave the situation as quickly as possible (i.e., an avoidant reaction). They further suggested that the presence of shading, rather than its absence, might signify coping with anxiety and consequently be indicative of good ego strength. Further, Handler and Reyher, (1964) suggested that shading "could represent an adaptive response to the task in an appropriate attempt to make the figures as true to life as possible and to give them substance" (p.262). In short, they (Handler & Reyher, 1965) said shading denotes, "adaptiveness, flexibility, and an appropriate reaction to a reality situation" (p.308). Making an inference from Mogar's (1962) study, Handler and Reyher (1965), implied that shading may be a "concomitant of general awareness of one self as he relates to, and yet is separate from his environment.

Therefore they suggested "the fallacy of assigning but a single meaning to the presence of an index of anxiety" (p.308). Concluding from Handler and Reyher (1964), the reviewers (Handler & Reyher, 1965) pointed out that "the presence of shading ...or {its} conspicuous absence may indicate either presence or absence of anxiety" (p.308). They suggested that some individuals may cope with anxiety by shading, whereas other withdraw. In short, according to Handler and Reyher (1965) a subject's behavior in regard to shading is dependent upon his characteristic anxiety reaction.

The above conclusions were primarily derived from Handler and Reyher's (1964) first study in which they used an experimental approach to test 57 male college students under a stress and nonstress condition. The nonstress condition was a group administration which included warm-up drawings (geometric figures) and the drawings of a man, an automobile, and a woman. Since subjects were used as their own controls, the same subjects were later administered the stress condition, which involved being ushered into a soundproofed, experimental cubical where they were connected to a GSR. Other apparatus in the room were turned on and the experimenter reportedly exaggerated operating the polygraph and gave the same, "nonstress instructions". It was reported that the subjects appeared "extremely anxious", but no objective measure was used.

The major finding of relevance for this research was the result that shading was found to be present more often in nonstress drawing, than in stress drawings.

In their second study, Handler and Reyher (1966) used a group of 96 male college students to determine the relationship between GSR measures and anxiety indices. The design and procedure was similar to their earlier study (Handler & Reyher, 1964) except that in this case the GSR recordings were used as data. The only conditions varied were a counter-balanced order of the drawings. In effect, this design was the "stress condition" of the previous study (Handler & Reyher, 1964), but not referred to as such in the report. Nonetheless, the results of the GSR recordings seemed to indicate this to be so. It was found that the GSR readings on the first drawings, regardless of object drawn, were higher than those on the second or third. Furthermore, they found increased shading with a decrease in autonomic arousal (i.e., less stress). This result was held to be congruent with their previous findings and interpreted as adaptation. However, Handler and Reyher (1966) failed to emphasize that they were dealing with an initially "stressed" group.

In an extension and replication of Handler and Reyher's (1964) research, Jacobson and Handler (1967) studied the effect of stress on the DAP indices and its relationship to extroversion. In a counterbalanced design 40 extrovert female nursing students scoring in the lower and upper 30% on the Maudsley Personality Inventory, drew pictures of a man, woman, and automobile under stress and nonstress conditions. Again, the results were reported to be similar to Handler and Reyher's (1964) findings for shading. More shading was present in nonstress drawings. An order effect

(stress to nonstress) was found indicating that, for females, the stress first condition produced more drawing anxiety signs than when it came second. But from the brief article, it could not be determined if shading were one of the "anxiety signs" showing an order effect. Nevertheless, the authors concluded from this and another study (Handler & Reyher, 1964) that there exists a differential reaction to stress between males and females. Extroversion-introversion was not mentioned as being related to shading.

Specifically testing the hypothesis that "amount of shading" in a figure drawing is an index of anxiety, Goldstein and Faterson (1969) used 23 paid male subjects, who were part of an experimental study on pre-sleep experiences and dream content. Over a period of four weeks all subjects viewed four films, 2 stress and 2 nonstress films, prior to the sleep experience. Independent measures reportedly confirmed the stressfulness of the films. Drawings were obtained following a post-sleep interview in which subjects recounted their feelings about the films and dream content. The authors contended that disturbance was still showing during these interview periods, and further that the Gottschalk analysis of post-sleep dream reports confirmed the presence of increased anxiety. Drawings were coded so that raters did not know which condition the subject was in; however, both authors, "working together"(p.455), ranked each subject's drawings for amount of shading. Amount of shading was defined as "including filling in areas or parts of areas, as well as sketching of contours and boundaries" (p.455).

They also considered as shading, "any extra graphic material not strictly necessary to portray the intended figure" (p.455). For each of the subject's male and female drawings, the drawing with the least amount of shading was ranked "1" and the drawing with the greatest amount of shading was ranked "4". Interrater reliability was reported as .90. The results showed that drawings of the male figure following the stress films contained more shading than those male-figure drawings following the neutral films. However, drawings of the female figure did not differentiate stress from neutral conditions. The authors concluded that their results "demonstrate the validity of the clinical use of amount of shading in the DAP as an index of anxiety when the self-sex drawing is used" (p.456). Although this study made an attempt to look at the Degree (amount and intensity) of shading, it had some serious methodological weaknesses which are obvious. Since these results contradicted Handler and Reyher's (1970) findings, they criticized Goldstein and Faterson (1969) for not having cited their previous works (Handler & Reyher, 1964, 1965). This contention likewise holds true for their later studies (Handler & Reyher, 1966; Jacobson & Handler, 1967).

The last study which pertains directly to this topic is a study by Johnson (1971b), who attempted to establish the validity of several of Machover's (1949) anxiety indicators by correlating them with the IPAT Anxiety Scale. Under group conditions, he administered to 103 male and female college students--approximately equal in number (Johnson, 1971a)--the IPAT and DAP in a counterbalanced order. Ratings of presence or absence of shading were made independently by three judges. Furthermore, when shading

was present, it was rated on the five-point scale for type of shading as was suggested to him by Machover in a personal communication (Johnson, 1971b). At one end of the continuum was the rational-controlled type of shading as seen in clothing design. At the other end was the diffused-messy shading which Machover indicated may be analogous to diffuse anxiety. Johnson (1971b) found that the presence of shading was relatively high in his sample (i.e., 92%). He reported a significant contingency coefficient ( $C = .31$ ,  $p < .05$ ) between IPAT anxiety score and type of shading, but not between presence or absence of shading and anxiety. In conclusion, he suggested that type of shading may be important in figure drawings and that this area should be clarified by further research. A definite weakness in Johnson's (1971b) study seems to have been his failure to check for possible sex differences in analyzing his data.

Summary. In order to shed further light on shading in the H-T-P Technique, research on shading in human figure drawings was also reviewed.

The original Draw-A-Man Test (DAM), developed by Goodenough (1926) as a measure of intellectual maturity, was later adapted by Machover (1949) to measure personality characteristics. Machover (1951) placed more emphasis on shading as an indicator of anxiety, but Harris (1963), who did much research with the DAM, implied shading to be related to intelligence.

Several comprehensive reviews (Roback, 1968; Swensen, 1957, 1968) of human-figure drawing research concluded that the relationship between shading and anxiety was indefinite. However, Handler and Reyher (1965) in a review specifically concerned with anxiety in drawings, concluded that

research generally upheld the validity of a number of drawing indices as predictors of anxiety. They suggested that Incidence of Shading alone may be a poor index of anxiety and that conflicting findings in the shading literature resulted from the manner in which subjects react to stress or anxiety. They implied that it is the subject's typical anxiety reaction which determined whether or not an individual shades. In research (Handler & Reyher, 1964, 1966), found shading present more often in drawings produced under nonstress, rather than under stress conditions--i.e., increased Incidence of Shading with decreased autonomic arousal. Concluding from these and other findings (Jacobson & Handler, 1967), Handler and Reyher (1965) stated that either the presence of shading or its conspicuous absence could be indicative of anxiety. Furthermore, they suggested (Handler & Reyher, 1964) the possibility that shading could represent an adaptive response--i.e., an attempt to make the drawings more realistic. The treatment of the Incidence of Shading in drawings by Handler and Reyher (1965) added some clarity to the topic and suggested other meanings of shading in drawings besides that of anxiety.

Nevertheless, other research (Goldstein & Faterson, 1969; Johnson, 1971b), attempting to measure the amount and type of shading, respectively, reported support for shading as an indicator of anxiety.

#### Review of Situationally Specific Anxiety

Complicating this indefinite relationship between shading and anxiety, and shading and intelligence, is a third factor--the relationship between anxiety and intelligence. From a review of the literature, Sarason

(1960) reported that although some of the research showed negative relationships between general anxiety and intelligence, most studies have found non-significant results. However, research which had related test anxiety to intellectual performance has found consistent negative relationships (Mandler & Cowen, 1958; Sarason, 1959; Sarason & Mandler, 1952). These findings seemed to be indicating that measures of test anxiety are more sensitive to factors specific to a testing situation than are measures of general anxiety.

In a concurrent article, Alpert and Haber (1960), citing the theoretical distinctions between general vs. specific anxiety theory, concluded that tests designed to increase situational specificity of item content allowed for a more sensitive measurement of anxiety and its effect in the academic achievement (testing) situation. They indicated that tests such as Mandler and Sarason's (1952) Test Anxiety Questionnaire (TAQ), are unidimensional, and therefore, they only measure the presence or absence of debilitating anxiety. If a low score were obtained, an inference is then made which implies that when anxiety-provoking cues are present in the environment, general drive level is raised and that this results in improved performance.

To more directly measure this general drive level, Alpert and Haber (1960) devised the Achievement Anxiety Test (AAT), which not only has a Debilitating Anxiety Scale (AAT-), but also a Facilitating Anxiety Scale (AAT+). These two scales are contained in one questionnaire with items randomly mixed. Subjects indicate the degree of applicability of each item

on a 5-point scale. This independent measure allows for the presence of both types of anxiety, or the absence of both (see Appendix A). An indication of the predictive validity of the separate scales in an academic situation was shown with multiple correlations which predicted grade-point average significantly better than either scale alone. Therefore, more strength was added to the argument that situationally specific scales appear to be more useful under testing conditions than just general debilitating anxiety measures. More information concerning this test is cited in Chapter II.

A further differentiation of test anxiety was made by Liebert and Morris (1967), who on the basis of previous factor analytic research of Mandler and Sarason's TAQ (Sassenrath, 1964; Sassenrath, Knight, & Kaiser, 1965) developed a short scale (Pre-Examination Questionnaire) which was intended to distinguish a cognitive factor ("Worry") and an autonomic arousal factor ("Emotionality"). Independently, the authors selected items from the TAQ which reflected "Worry" (W) and "Emotionality" (E), respectively. They then combined five items measuring each scale into one questionnaire. Subjects rate each item on a 5-point scale and separate scores are derived (see Appendix B). Some construct validity for the separate scales was indicated by the consistent findings in five studies on different samples (Liebert & Morris, 1967; Morris & Liebert, 1970; Spiegler, Morris, & Liebert, 1968) of a predicted negative relationship between Worry and grades, whereas Emotionality was largely unrelated. The authors concluded that it is crucial to keep this cognitive-affective distinction in mind when investigating the relationship between "anxiety" and performance.

Wine (1971) heeded this advice when she proposed a directional attentional interpretation of test anxiety. From a review of the literature, she concluded that "highly-test-anxious persons typically perform more poorly on tests than do low-test-anxious persons. This is true particularly when the tests are administered under stressful, evaluative conditions" (p.92). Further, she concluded that this difference in performance is largely due to a difference in attentional focus between high- and low-test-anxious persons during task performance. Whereas the low-test-anxious person focuses on task-relevant variables while performing a task, the high-test-anxious subject is primarily internally focused on self-evaluative, self-deprecatory thinking (i.e., making negative self-statements) as well as on his autonomic activity. Since complex tasks require full attention for effective performance, a subject cannot perform adequately while dividing his attention between internal (self) and external (task) cues. Wine proposed that the reason for this outcome seems to be that evaluative, testing situations have opposite effects on the attentional focus of high- and low-test-anxious persons. When being evaluated, the high-test anxious individual turns most of his attention inward while the low-test-anxious person focuses more fully on the task. This condition implies that the high-test-anxious person attends to fewer task cues than does his low-test-anxious counterpart. Wine (1971) stated that her attentional interpretation of the effect of test anxiety on task performance is consistent with Easterbrook's (1959) conclusion "that emotional arousal consistently narrows the range of cue utilization in task

performance" (p.97). Since Easterbrook's definition of arousal is very broad and includes anxiety as one aspect, it can be concluded that anxiety arousal restricts the range of task cue utilization. In fact, several studies (Agnew & Agnew, 1963; Bruning, Capage, Kozuh, Young, & Young, 1968; Tecce & Happ, 1964; Wachtel, 1966, 1968) after Easterbrook's (1959) review, confirmed that stressful, anxiety-provoking situations tended to reduce the range of cue utilization in comparison to nonstressful conditions.

Most relevant to this review was the study by Wachtel (1968) in which he reported the relationship between test anxiety and cue utilization in a motor-performance task. Under a "personality diagnosis" condition-- i.e., subjects were told that their personality was revealed by the task-- there was a significant negative correlation of test anxiety with speed scores. Explaining the better performance on this part of the motor task, Wachtel combined Easterbrook's (1959) attentional formulation and the interfering response hypothesis of the test anxiety theorists (Mandler & Sarason, 1952) in concluding that when attention is diverted inward, there is less attention available for external stimuli.

Since Wine's (1971) directional-attentional interpretation of the effects of test anxiety is similar in concept to Alpert and Haber's (1960) debilitating anxiety and Liebert and Morris' (1967) worry component, it was conjectured that persons with high debilitating anxiety or high worry tendencies should do more poorly on a complex task than persons who are low in these anxiety components. If it were assumed that drawing is a complex task, then these same formulations should also apply to a grapho-motor performance. Furthermore, since shading is an unessential (superfluous) task cue in a drawing, it follows from the

directional-attentional formulation of test anxiety that its use would typically occur in drawings of persons lower in test anxiety. If stress were then applied, the differential focusing effects would probably increase the shading of low-test anxious persons but reduce or inhibit shading by high test anxious subjects. This line of reasoning seems to explain the findings of research in which less shading was produced under stress rather than under nonstress conditions (Handler & Reyher, 1964, 1966; Jacobson & Handler, 1967).

Summary. Specificity of anxiety self-report instruments seems to increase measurement sensitivity and produce more consistent results in research involving this variable. Alpert and Haber (1960) held that test anxiety is not unidimensional and therefore devised the Achievement Anxiety Test (AAT) which was purported to measure facilitating, as well as debilitating test anxiety. Having arrived at a similar conclusion from factor analytic research--i.e., that test anxiety was not unidimensional, Liebert and Morris (1967) developed the Pre-Examination Questionnaire (PEQ), which reportedly measures a cognitive factor (Worry) and an autonomic arousal factor (Emotionality).

Adding further understanding to the complexity of situationally specific anxiety was Wine's (1971) proposal of a directional-attentional interpretation of test anxiety. She explained the differential performance of high- and low-test anxious individuals on complex tasks as resulting from a differential focusing on available cues. Under evaluative (stressful) testing condition, high test anxious subjects focus on internal (self-referent)

cues, whereas subjects low in test anxiety focus on external (task relevant) cues. In other words, under stressful conditions, effective cue utilization in a complex task is reduced. Similarity was noted between Wine's (1971) directional-attentional formulation of the effects of test anxiety and the measurement of both Alpert and Haber's (1960) debilitating anxiety and Liebert and Morris' (1967) worry component.

Following this line of reasoning, the assumption was made that drawing is a complex task and that, therefore, shading is a task cue which may or may not be used, due to the direction of the subjects attentional focus. This formulation was offered as a likely explanation for studies (Handler & Reyher, 1964, 1966; Jacobson & Handler, 1967) finding less shading under stressful conditions.

#### Statement of the Problem

Based upon the review of the literature, it was concluded that there appears to exist a sex difference in the use of shading in drawings, which had previously gone unmentioned. Only recently has this finding been reported (Marzolf & Kirchner, 1970, 1971, 1972; Shershen, 1971; Berger, Note 1) and taken into consideration. However, it was felt that more attention needed to be given to this factor if the meaning of shading in drawings was to be deciphered. Furthermore, sex differences in levels of anxiety were also suggested in the literature. As a result, the relationship between shading in projective drawings and anxiety remained largely unexplained.

These contradictory findings seemed to have resulted from a weakness in basic theoretical assumptions about the shading variable, as well as from weaknesses in research methodology--i.e., not analyzing data separately by sex. The most obvious error of assumption was the failure to differentiate shading in drawings into its many facets, instead of treating it as a unitary, discrete characteristic. Further error of assumption was demonstrated when researchers tried to relate an undifferentiated shading with a unitary "anxiety", when, in fact, a complex construct exists (Cattell & Scheier, 1961; Spielberger, 1966, 1972a, 1972b). Specificity in the measurement of anxiety and of shading appeared to be a more judicious approach to solving the problem of shading and its relationship to anxiety.

Justification for studying the shading phenomenon in projective drawings was based upon the fact that shading is an observable product in a drawing and an attempt to evaluate it empirically would seem to be legitimate (Bieliauskas & Clarke, 1965). Although a precise definition of shading was lacking, its presence or absence could be fairly reliably agreed upon (Handler & Reyher, 1964, 1966; Marzolf & Kirchner, 1970, 1971, 1972; etc.). Secondly, once agreed upon as being present, shading could successfully be differentiated as to the amount or degree present (Bieliauskas & Clarke, 1965; Goldstein & Faterson, 1969; Shershen, 1971; Berger, Note 1). Finally, shading could further be judged as to its quality or type (Johnson, 1971b; Shershen, 1971). However, as previously stated attempts made to rate this latter aspect of shading have not been fully explored.

Therefore in addition to rating the Incidence and Degree of Shading, it was a secondary purpose of the present study to explore a method for rating the Quality of Shading along a continuum ranging from the "good" use of shading at one end to its "poor" use at the other. It was felt that success in this attempt would aid in the possible differentiation of shading along a qualitative dimension according to kind or type. It was hoped the net result would demonstrate that shading is not a unitary characteristic of projective drawings, but in fact, a complex variable. Once this aspect of shading were differentiated into its several facets, then further research into its psychological meaning would likely be more fruitful and productive.

With the supposition that it would help explain some of the previous contradictory results, sex differences were taken into consideration in all phases of this research. All data were analyzed to further clarify this male-female difference in use of shading in drawings.

#### Rationale of the Study

On the basis of the previous criticisms concerning the typical approaches to the measurement of anxiety, this study attempted to be comprehensive, yet specific in looking at this variable. In order to examine most relevant contingencies, general as well as situationally specific anxiety, was measured.

Of particular importance for this research was Wine's (1971) directional-attentional interpretation of situationally specific anxiety.

From this formulation it was conjectured that in testing situations, persons with high debilitating anxiety or high worry tendencies, would direct their attention away from the immediate task at hand and, instead, turn most of their attention inward in a ruminative manner. In so doing, they would restrict their range of task cue utilization. Since drawing was assumed to be a complex task requiring full attention for an adequate job, then it was reasoned that any interference with this full attention to the task would result in a diminished performance. Further, if shading were considered a task cue contributing to the enhancement (embellishment) of a drawing, then self-directed, attentionally demanding anxiety should restrict the use of shading to a minimum. However, if task-directed, facilitating anxiety (drive) was present, the individual, if involved in the drawing task, should use a wide range of task cues--including shading. On this basis, it was conjectured that individuals with high debilitating anxiety or high worry tendencies would shade less because they would be focusing more on self-referent, rather than on task-relevant cues. Conversely, it was speculated that individuals high in facilitating anxiety, or with low worry dispositions, should shade most. The emotionality component was assumed to have an effect similar to that of debilitating anxiety, i.e., too much should diminish performance.

Since Alpert and Haber's Achievement Anxiety Scale and Liebert and Morris' Pre-Examination Questionnaire were purported to be measuring these aspects of situationally specific anxiety, these instruments were employed in this research to empirically determine the relationship of their individual components to shading in the H-T-P.

If these measures would show significant predictive relationships with shading in drawings, then a more accurate meaning of shading could be derived for use by clinicians--thus, modifying and refining their interpretations of client drawings.

An additional purpose of this study was the exploration of a proposed "motivational interpretation" of shading in drawings.<sup>1</sup> This proposed interpretation was partly based on the observation that shading in drawings is a nonessential characteristic, usually present in drawings of better quality, (Harris, 1963). Furthermore, research (Handler & Reyher, 1964, 1966; Jacobson & Handler, 1967) indicated that shading was present in nonstress (normal) conditions more often than it was in stressful, anxiety-provoking conditions. Finally, the finding (Shershen, Note 3) of a significant positive relationship,  $r(38) = .43, p < .01$ , between drawing time and Degree of Shading in a drawing, seemed to suggest a motivational aspect to shading. This finding would appear to indicate that the amount of time spent drawing could predict some of the variance in shading scores, but when the data were analyzed separately by sex, there was only a significant relationship for females,  $r(18) = .65, p < .01$ , but not for males,  $r(18) = .14, p > .05$ . This result made evident a further sex difference on shading in drawings, and gave some empirical support for a possible motivational interpretation of shading. If time spend drawing

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<sup>1</sup>Appreciation for suggesting this motivational interpretation is expressed to Mlle Louise Capagna, former fellow student and now counsellor at the University of Ottawa, Counselling Services.

could be taken as a measure of involvement in the drawing task, and if shading were proportionally related--as it seemed for females--then shading could be used as an independent measure of involvement. Thus in the absence of a time score, as in a group situation, shading could be a useful covert index of subject motivation. Confirmation of this finding, it was thought, would add more utility to the H-T-P as a screening device.

Because intelligence has been claimed as being related to shading in drawings, this variable was also recorded when available. Although this relationship had been confirmed in only one study (Perkinson, 1956), it was felt by the researcher to be positively related to the quality of the shading. This aspect of shading would probably be shown by giving the effect of three-dimensionality to a drawing part or whole. Since this research proposed to differentiate shading into its qualitative aspects, it was hypothesized that more high quality shading would be found in drawings of the brighter individuals and, conversely, more low quality shading would be found in drawings of the duller subjects.

Finally, since the quality of the shading could also possibly be influenced by specialized drawing training, an account of this factor was obtained and taken into consideration.

### Strategy of the Research Design

Given that research in the area of shading in projective drawings is still in an early, exploratory stage and given the proposed rationale of this study, it was felt that a broad based approach be taken. A correlational

design using the selected measures, it was assumed, would yield maximum information and produce the clearest results in this ill-defined area. At the present stage of research, it was felt that examining sex differences on shading in drawings and refining the rating categories of shading (i.e., Incidence, Degree and Quality), would contribute greatly to more definitive research in this area in the future.

It was therefore, the strategy of the present research, to administer the H-T-P and other instruments to a large number of male and female university students and to relate these measures accordingly. Specific procedures, which were followed in collecting and analyzing the data, are reported in Chapter II. A formal statement of the research hypotheses concludes the last section of this chapter.

Hypotheses. On the basis of previous research, the above assumptions, and the proposed theoretical rationale, the following research hypotheses were formulated. They were tested in the null form with appropriate statistical analyses.

- (1) Females will show a significantly greater Incidence (presence or absence) of Shading in the H-T-P than males.
- (2) Males will show a significantly greater Degree (amount and intensity) of Shading in the H-T-P than females.
- (3) Females will produce a significantly higher Quality ("goodness" or "poorness") of Shading in the H-T-P than males.

All succeeding hypotheses are stated only once, but refer to all three categories of shading: (a) Incidence, (b) Degree, and (c) Quality.

- (4) There is no significant relationship between shading (a, b, and c) in the H-T-P and trait anxiety (STAI-T).
- (5) There is a significant negative relationship between shading (a,b, and c) in the H-T-P and state anxiety (STAI-S).
- (6) There is a significant negative relationship between shading (a, b, and c) in the H-T-P and debilitating anxiety (AAT-).
- (7) There is a significant positive relationship between shading (a, b, and c) in the H-T-P and facilitating anxiety (AAT+).
- (8) There is a significant negative relationship between shading (a, b, and c) in the H-T-P and worry (PDQ).
- (9) There is a significant positive relationship between shading (a, b, and c) in the H-T-P and general drawing self-evaluation (DSE).
- (10) There is a significant positive relationship between shading (a, b, and c) in the H-T-P and expectancy of success on a specific drawing task (DTE).
- (11) There is a significant positive relationship between shading (a, b, and c) in the H-T-P and interest in a specific drawing task (TDI).

- (12) There is a significant positive relationship between shading (a, b, and c) in the H-T-P and formal drawing instruction (FDI).
- (13) There is a significant relationship between shading (a, b, and c) in the H-T-P and intelligence (Otis IQ).

## Chapter II

### METHOD

This chapter presents the description of the research sample, the psychometric instruments employed, and the procedures used in the research. It then explains the rating of the three categories of shading. Finally, it presents the statistics used to test the hypotheses and reports those employed in the subsequent statistical analyses.

#### Subjects

The subjects for this study were 142 male and 225 female students who were enrolled in 14 English-language psychology courses at the University of Ottawa. Although students in first- to third year courses were included in the sample, the majority (70%) were from introductory psychology classes.

The age range of the sample was 16 to 35 years with a mean age of 20.7 (median = 20.1; mode = 19.0). Intelligence quotients (Otis IQ's) obtained on a subsample of 137 subjects ranged from 85 to 140 with a mean of 117.6.

#### Research Instruments

For this research both standardized and devised psychometric instruments were used, but of course, the H-T-P was the main instrument of concern. The following section describes all measures employed in the research. It begins with a description of the criterion instrument (i.e., the H-T-P) and then elaborates on the remaining predictor measures.

House-Tree-Person Technique (H-T-P). The H-T-P (Buck, 1948), a commonly used projective drawing technique of personality assessment (Lubin, Wallis, & Paine, 1971), was the main instrument of research in this study. According to the revised manual (Buck, 1966), the usual individual administration consists of two phases (achromatic and chromatic), each followed by a post-drawing interrogation. However, for this research only the achromatic phase was used in a group administration, following the procedure indicated in the revised manual (Buck, 1966). Standard sized (8½ x 7 inch) mimeographed H-T-P drawing forms were used, as were HB (No. 2) Eagle pencils.

Although the H-T-P has a quantitative scoring system (Buck, 1948, 1966) indicating "adjustment", only shading in the drawing was of concern for this research. In all statistical analyses, shading ratings were used as the criterion scores.

Achievement Anxiety Test (AAT). Devised by Alpert and Haber (1960), the AAT consists of a 10-item Debilitating Anxiety Scale (ATT-) and a 9-item Facilitating Anxiety Scale (AAT+) both of which are contained in one questionnaire with items randomly mixed (see Appendix A). Subjects indicate the degree of applicability of each item on a 5-point scale (e.g., Always, often, sometimes, rarely, never, etc.). Since the originators designed the AAT to measure two independent anxiety constructs, they in fact, found an average correlation between them of  $r(377) = -.37, p < .01$ .

Although not reported as a trait measure of situationally specific anxiety, the authors indicated that over a 10-week interval, test-

retest reliabilities for the facilitating and debilitating scales were .83 and .87, respectively. Test-retest reliability over an 8-month period for the AAT+ was .75; for the AAT-, it was .76. In other research (Allen, 1970), evidence of the stability of the AAT administered three times over the period of a semester was fairly high (AAT-:  $r(23) = .63, .65, \text{ and } .71, p < .01$ ; AAT+ = .50, .55, and .65,  $p < .01$ )--even though the administration conditions varied from regular, to exam, and to exam role-playing conditions, respectively.

Evidence presented for the concurrent validity of the debilitating scale was a correlation with Mandler and Sarason's (1952) TAQ of  $r(38) = .64, p < .01$ . An indication of the predictive validity of the separate scales was suggested by the originators to be shown by multiple correlations which predicted grade-point average significantly better than either scale alone--i.e., the facilitating anxiety scale added to the prediction of academic grades over and above that predicted by the traditional debilitating anxiety scale. As further evidence of the validity of the corresponding AAT scales to predict grade-point average, Allen, Lerner, and Hinrichsen (1972) reported to have found significant positive relationships with the AAT+ and significant negative relationships with the AAT- ( $n = 122$ ); however, no actual values were included in the short article. Others (Dember, Nairne, & Miller, 1962; Milholland, 1964) have also found the facilitating-debilitating anxiety scales to be useful in academic testing situations.

Pre-Examination Questionnaire (PEQ). On the basis of previous factor analytic research of Mandler and Sarason's TAQ (Sassenrath, 1964; Sassenrath, Kight, & Kaiser, 1963), Liebert and Morris (1967) developed a short scale, the Pre-Examination Questionnaire, which purportedly distinguishes a cognitive factor ("Worry") and an autonomic arousal factor ("Emotionality"). Independently, the authors selected items from the TAQ which reflected Worry (W) and Emotionality (E), respectively. Five items tapping each scale were then combined into one questionnaire. Subjects rate each item on a 5-point scale and separate scores are derived (see Appendix B). Since the PEQ is considered a measure of state-situationally specific anxiety, alpha reliabilities were reported for the W and E scales--.69 and .83, respectively (Morris & Liebert, 1970). In another sample, which was cited in the same article, alpha coefficients were found to be .68 (W) and .76 (E).

Some validity for the separate scales is indicated by the consistent predicted finding--in five studies on different samples (Liebert & Morris, 1967; Morris & Liebert, 1970; Spiegler, Morris, & Liebert, 1968)--of a negative relationship between Worry and expectancy of exam success and/or exam grade; whereas, Emotionality was shown to be related to the immanence of the exam situation--i.e., E was maximal immediately prior to the exam, but dropped off immediately afterwards.

For this research, a slight modification of some items was made in order for the scales to have relevance for a specific "test"--i.e., the drawing test. This modified scale was called the Pre-Drawing Questionnaire (PDQ) in order to infuse in it "face validity".

State-Trait Anxiety Inventory (STAI). This relatively recent anxiety instrument, by Spielberger, Gorsuch, and Lushene (1970), goes under the cover name of the Self-Evaluation Questionnaire. As reported in the manual (Spielberger et al., 1970), the STAI is "comprised of {two} separate self-report scales for measuring two distinct anxiety concepts: state anxiety (A-State) and trait anxiety (A-Trait)" (p. 3). Both scales consist of 20 similar statements which require the subject to indicate how he/she feels. The primary difference between both scales is that the A-Trait scale (STAI-T) requires the subject to indicate how he or she generally feels; whereas the A-State scale (STAI-S) requires the subject to indicate his or her feelings at a particular moment in time (see Appendix C).

The STAI was reportedly developed as a research instrument to investigate anxiety phenomena in a "normal" (college) population. According to the authors' manual (Spielberger et al., 1970), the A-State scale can be used to determine actual levels of state anxiety, or as an index of drive level (D) as defined by Hall (1943) and Spence (1958).

Test-retest reliabilities, reported over intervals of 1-hour, 20-days and 104-days for the A-Trait scale, ranged from .73 to .86 ( $n = 22$  to 109); those for the A-State (over the same periods on the same subjects), ranged from .16 to .54 with a median reliability coefficient of .32. These lower test-retest reliabilities for the A-State scale were anticipated by the developers since this scale was designed to be sensitive to

situationally specific (state) factors. Therefore, alpha coefficients ranging from .83 to .92 were reported as giving a better indication of the reliability of this scale.

According to the authors, evidence of the concurrent validity of the A-Trait scale was shown by its relatively high correlation with other measures of trait anxiety on a male ( $n = 80$ ) and female ( $n = 126$ ) sample, respectively, (IPAT = .76, .75; TMAS = .79, .80; and AACL = .58, 52). Evidence presented by the authors as to the construct validity of the A-State scale was the differential response of subjects to stressful and relaxing conditions--i.e., A-State scores showed an increase under stress conditions, and a decrease as a result of relaxation training.

The STAI, with both its scales, is based on Spielberger's (1966) State-Trait Anxiety Theory and, according to Smith and Lay (1974), it "has become the most widely used instrument in research of anxiety phenomena" (p.519). The STAI's value as a measure of state and trait anxiety seems to have been well established in over 350 reported studies (Spielberger, Woodhouse, & Brinkman, Note 4).

Drawing Interest Scale. This devised measure consisted of three, 7-point, bipolar, rating scales (see Appendix D). After completing their drawings, subjects were asked to rate their "interest in doing the drawing task", for the following three specific moments in time: (1) before beginning, (2) while drawing, and (3) after completed. A similar procedure--at least for the A-State scale--was suggested by Spielberger (1972a).

Since interest in doing a task gives an indication of the motivation for that task it was assumed this scale would yield a measure of involvement in the drawing task. These three scales were used separately, and as a combined score. Also, on this sheet were two items requesting the subject to indicate any formal drawing instruction, and if any, to specify the duration of that training (see Appendix D).

Otis Self-Administering Tests of Mental Ability. Since intelligence was to be used as an additional variable in this research, Otis IQ scores were obtained anonymously (i.e., through student ID numbers) from the University of Ottawa Counselling Services,<sup>2</sup> which had administered the Otis S-A (Higher Examination: Form A) to most entering students. Those subjects whose IQ could be obtained ( $n = 137$ ) were used as a subsample in the data analysis. Although reliability (average alternate form (A & B):  $r(250) = .92$ ) and validity (correlation with Advanced Examination after a two year interval:  $r(180) = .89$ ; correlations of Higher Examination with "scholarship":  $r$ 's from .55 to .59) information presented in the manual (Otis, 1950) is not impressive, the Otis S-A, is, nevertheless, a well accepted group measure of general ability, which compares favorably with other verbally weighted tests of intelligence (Buros, 1949).

### Procedure

The subjects were solicited from and administered all research instruments during 14-regularly scheduled psychology courses. Permission

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<sup>2</sup> Appreciation is expressed to Dr. Sergio J. Piccinin, Director, for suggesting the anonymous procedure and making the scores available.

to use the class time was obtained from each instructor in advance; however, it was requested that the students not be "warned" before the scheduled meeting that someone would be coming to solicit volunteers for research.

Subjects were requested by the experimenter to participate in his research for the doctoral thesis. Before volunteering, subjects were only informed that the research would require them "to complete a number of questionnaires and to do several different tasks"; they were also told that the entire procedure would take approximately 65 to 75 minutes to complete--i.e., the entire class period. Full cooperation was requested and anonymity was assured. Only those students consenting to participate in the research and seriously committed to cooperating on all tasks were requested to remain. All other students were allowed to leave the class.

Pencils were then distributed with the instructions to take four pencils (i.e., three sharp pencils and one dull one). After everyone had the required number of pencils, the A-State scale was passed out. Subjects were requested to use the dullest pencil to complete the STAI-S and all succeeding questionnaires. They were further requested to complete, on each individual form, coding information which included student ID number, course and section, sex, and date.

After the STAI-S was completed, the subjects were informed that they would be required "to draw a picture of a house, a tree, and a person".

However, before doing this task, they were requested to complete the Pre-Drawing Questionnaire (PDQ). Following this, the subjects were distributed the H-T-P drawing forms and given the following instructions.

Subjects were informed that they would have 30 minutes to complete their best drawing of a house, a tree, and a person--drawn in that order. They were told to apportion their time on the three drawings as they wished, but were not to exceed a 30-minute total. A large clock, in view of all subjects, was used to aid in their timing. All subjects were stopped at the end of the 30-minute time period and not allowed to return to their drawing. They were further instructed to use a sharp pencil for each drawing, to erase as much as they wished, and not to look at other students' drawings.

Immediately after the drawings were completed, the Drawing Interest Scales were filled-out. On the same form, subjects indicated any drawing instruction which they may have had. Following this, subjects completed the A-Trait scale and finally the Achievement Anxiety Test.

Retest Procedure. In order to determine the reliability of shading in the H-T-P, two classes ( $n = 46$ ) were retested with the same procedure as stated above. Reliability measurements were also obtained on the other research instruments, but the numbers for some of the scales varied due to several subjects having to leave before the completion of the last two questionnaires.

### Defining and Rating the Shading

The following section indicates the definition of shading accepted for this research, describes the procedures used in rating the shading, and explains the training of the raters.

#### Defining Shading

Of crucial importance to this research was the accurate rating of shading in the H-T-P drawings. However, before this could be accomplished, an appropriate definition of shading had to be selected from among those used by different researchers. After careful consideration, it was decided to employ the following definition of shading which was used by Jones and Thomas (1965): "markings...which in any degree denoted or emphasized: (1) a third dimension or different plane; (2) differences in lightness or darkness; or (3) differences in texture" (p.265). As a further aid to raters, the illustrated criteria of Goldstein and Faterson (1969; see Appendix E), which included "filling in areas, or parts of areas, with scribbles, lines, or patterns that do not necessarily have the 'shadowing' quality..., as well as sketching of contours and boundaries" (p. 1), was followed. The completely elaborated criteria used by the raters is found in Appendix E.

#### Categorizing the Shading

In this research shading was quantified into three different categories: (1) Incidence (presence or absence), (2) Degree (amount

and intensity), and (3) Quality ("goodness" or "poorness"). Incidence of Hair Shading was also recorded but as a separate category. However, only Incidence of Hair Shading and Degree and Quality of Shading were actually rated by the judges; Incidence of Shading was derived from the Degree of Shading scores, i.e., drawings with zero Degree ratings were considered to be absent of shading, and vice versa.

#### Rating the Degree of Shading

The procedure used to rate the Degree of Shading was a refinement of a method reported by Bieliauskas and Clarke (1965). Their method involved using a plastic grid which divides the drawing page into four, equal quadrants. Each quadrant is then rated separately on a 7-point scale which is weighted as to area covered and intensity. However, in the modified method, which was employed in this research, each quadrant is subdivided into four parts, making a total of 16 subdivisions for the whole drawing.<sup>3</sup> Still concentrating on only one quadrant at a time, with the aid of a cardboard mask, the rater was required to first decide upon the intensity of the shading (i.e., light, moderate, or heavy), and then, to simply count the unit-areas covered by each intensity of shading. The different intensities of shading were subsequently weighted according to the following scale: 1 = light intensity, 2 = moderate intensity, and 3 = heavy intensity. These weightings were then multiplied by the actual unit-areas covered by a particular intensity. For each individual rater,

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<sup>3</sup> Appreciation is expressed to Mr. Julius Roehl, fellow student, for his suggesting this modification.

a subject's Degree of Shading score for the whole drawing (i.e., House, Tree or Person) was the sum of all four quadrants. A subject's total Degree of Shading score (i.e., H-T-P total) was obtained by simply summing his/her weighted scores from all three raters for the House, Tree, and Person drawings. Possible minimum and maximum scores for any one drawing of any particular subject range from 0 to 58; minimum and maximum scores for an H-T-P drawing set range from 0 to 174.

Training Degree Raters. Raters for the Degree of Shading category were three, first-year doctoral candidates in clinical psychology at the University of Ottawa.<sup>4</sup> All three raters had some previous experience using projective drawings; but since this research was specifically concerned with shading in the H-T-P, the three raters were trained in recognizing shading according to the adopted criteria, discriminating it by intensities, and estimating unit-area coverage. In all, three training sessions of approximately 1½ hour duration were held. Practice Ebel inter-rater reliabilities--intra-class correlations (Guilford, 1954)--with the modified Degree of Shading rating method were .90, .91, and .94, respectively.

Degree Rating Procedure. For the rating of the actual subject drawings, all 367 original H-T-P and 46 retest H-T-P drawings were randomly ordered to eliminate any systematic bias in regard to class, sample, or sex. All three raters then independently rated each subject's drawings

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<sup>4</sup> Appreciation is expressed to Diana Teta, Nobuko Kobayashi, and Ken Deffenbach for their tireless effort in rating the drawings.

in the order of House, Tree, and then Person. Raters worked approximately 10 hours each to rate all 413 drawings sets. Each rater's scores for all 3 drawings were derived by the above weighting method and then summed to yield the subject's score for the Total H-T-P.

#### Rating the Quality of Shading

Since quantifying the Quality of Shading had only been superficially attempted previously (Shershen, 1971), it was necessary to consult the writings of Buck (1966), Kinget (1952), and Machover (1949) in regard to this topic. From their treatment of the topic, a 10-item, 7-interval, bipolar, adjectival scale was developed. These 10 Quality of Shading Scales (QSS) and their assigned weights appear in Table 1. Definitional guidelines for rating the Quality of Shading are found in Appendix F.

Training Quality Raters. For these ratings, three different judges,<sup>5</sup> first-year master's students in psychology at the University of Ottawa, were given a 1½ hour training session on the Quality of Shading and the use of the Quality of Shading Scales. Their practice Ebel interrater reliability coefficient was .73.

Because of the exploratory nature of the problem and the difficulty of the task involved, a random subsample of only 70 H-T-P drawing

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<sup>5</sup> Appreciation is expressed to Ken McKinnon, Jennifer Connolly, and Susan Elliott, who did the rating only for the money, but nevertheless did a fine job.

Table 1

## Quality of Shading Scales and Assigned Weights

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1. Enhancing	<u>7</u>	<u>6</u>	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	Detracting
2. Ordinary	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	Artistic
3. Random Strokes	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	Controlled Strokes
4. Two-Dimensional	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	Three-Dimensional
5. Reinforced	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	Unreinforced
6. Very Light	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	Very Heavy
7. Appropriately Used	<u>7</u>	<u>6</u>	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	Inappropriately Used
8. Over Meticulous	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	Sloppy
9. Uniform-in-Type	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	Varied-in-Type
10. Poor Quality	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	Good Quality

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sets were selected from all 137 subjects having IQ scores recorded. This procedure was designed to yield two equal random subsamples of 35 males and 35 females. These drawings were then randomly re-ordered for each rater.

Quality Rating Procedure. On the basis of Guilford's (1954) treatment of scaling methods, the following procedure was adopted. All 70 H-T-P drawing sets were rated on only one scale at a time. The order in which the scales were rated was randomly determined for each rater. To minimize the halo effect and proximity errors between scales, each rater working independently went through all 70 drawing sets 10 times, i.e., once per scale. Each of the raters reported the task to take approximately 10 hours to complete. The QSS forms used are found in Appendix F.

Weights were assigned to the intervals as indicated in Table 1. Scores were derived for each subject's individual drawing (i.e., House, Tree or Person) by summing each rater's ratings on all 10 individual scales. Total Quality of Shading score for a subject's H-T-P was a simple sum of these three individual drawing scores.

Both for Degree and Quality of Shading, unweighted scores were coded on computer optical scanning data sheets and read onto magnetic tape. Weighting and summing were accomplished by the computer. All other research data were likewise coded on optical scanning sheets in raw form, and scored by the computer.

### The Statistical Analysis of the Data

This last section of Chapter II explains the statistical analyses of the data. First is presented the general methods of data analysis. Next is presented the treatment of the interrater reliabilities for the three shading categories and the calculation of the test-retest reliability coefficients. Explanation of the descriptive statistics of both criterion and predictor variables is found next. Following this is the presentation of the statistical tests of the null hypotheses. Finally is found an elaboration of all subsequent statistical analyses and the results of the factor analysis of the Quality of Shading Scales.

#### General Methods of the Data Analysis

All research data for this thesis were coded on optical scanning data sheets in raw form. These data sheets were then read onto magnetic tape and weighted, scored, and summed by the University of Ottawa computer. All major statistical analyses were performed on this computer using the Statistical Packages for the Social Sciences (SPSS) "canned" programs (Version 5.1, SPSSH; Nie, Bent, & Hull, 1970; Nie, Hull, Kim, & Steinbrenner, 1973).

Pearson product-moment correlation coefficients were computed for all bivariate-continuous data. Point-biserial coefficients were calculated for the correlation of continuous-dichotomous variable pairs, and phi coefficients were computed for the correlation of two dichotomous variables. The point-biserial and phi coefficients were used in preference to the biserial and tetrachoric coefficients because the latter two are inexact

estimates of the product-moment correlation and they cannot be employed in any subsequent multivariate analysis (Nunnally, 1967). Tests of significance for all bivariate correlation coefficients were obtained by selecting either the one- or two-tailed test option in the SPSS PEARSON CORR program. The minimum level of statistical significance set for all data analyses was at  $p < .05$ .

### Preliminary Statistical Analyses

Interrater Reliability. Since the accurate rating of shading was crucial to this research, presentation of the interrater reliabilities is discussed prior to the reporting of the tests of the hypotheses. Interrater reliability estimates of the Incidence of Shading were obtained by computing the average per cent agreement among all three raters (Marzolf & Kirchner, 1970). For the remaining two categories of shading, Degree and Quality, the Ebel interrater reliability formula, an intra class correlation (Guilford, 1954), was employed. In reporting interrater reliabilities, as well as all other statistical analyses, data are cited for the House, Tree, and Person separately, as well as for the combined H-T-P.

Test-Retest Reliability. Because Degree of Shading was the shading category of most concern, a test-retest reliability estimate was obtained by repeating the entire battery of tests on two classes after approximately a five-week interval. The number of subjects from both classes, an introductory and an advanced psychology class, totaled 46 for the shading reliability measures. For the last two instruments of the administration, the

numbers varied somewhat due to several subjects having to leave for their next class before their completion. Although a larger retest sample would have been more desirable, constraints of the time of the year--i.e., near the end of the term--made this an impossibility.

Pearson product-moment correlations are reported for the test-retest reliability coefficients.

### Statistical Analysis of the Null Hypotheses

Difference Hypotheses. Hypotheses 1-3 dealt with the important consideration of sex differences between males and females in their shading response on the three categories. Null hypothesis 1, that there is no significant difference between males and females in Incidence of Shading, was tested with a  $\chi^2$  test. Null hypothesis 2, that there is no significant difference in Degree of Shading between males and females, was tested using a two-tailed, t-test analysis. Likewise, null hypothesis 3, of no significant difference between males and females in the Quality of Shading, was tested in the same manner, i.e., employing a two-tailed, t test.

Correlational Hypotheses. All succeeding correlational hypotheses (i.e., null hypotheses 4-13) were stated only once, but referred to all three categories of shading: (a) Incidence, (b) Degree, and (c) Quality. Correlational analyses were performed between all predictor-criterion variable pairs; i.e., point-biserial correlations were computed

for the Incidence category and Pearson product-moment correlations were employed with the Degree and Quality criteria. The data were analyzed and are reported for all 367 subjects combined, and for males ( $n = 142$ ) and females ( $n = 225$ ) separately. Tests of significance for all correlational hypotheses were obtained by selecting either the one- or two-tailed test option in the SPSS PEARSON CORR program. Differences between male and female correlations were tested by converting the  $r$ 's to Fisher  $Z$ 's and obtaining the standard error of the difference in the usual manner (McNemar, 1966).

#### Subsequent Statistical Analyses

Test of Linearity. In order to determine the possibility of non-linearity in the regression of Y on X, the correlation ratio (eta) was computed between all predictor and criterion variables. Although it is known that eta may be computed in both directions, the interest of this research was only in the expressed direction--i.e., the prediction of Y on X. Tests of this assumption were made by pairwise comparisons between the corresponding Pearson  $r$ 's and eta coefficients (McNemar, 1966).

Multiple Regression Analysis. As a further description of the data, stepwise multiple regression analysis was performed using the separate scales which could not logically be combined (i.e., A-State, A-Trait, etc.) and all composite variables (i.e., Total Drawing Evaluation (TDE), etc.) as predictors. This resulted in a total of 12 predictor variables which

could possibly entered into the regression equations. Separate stepwise multiple regression analyses were computed with the House, Tree, Person and total H-T-P as the criteria. Since a multiple  $R$  can be interpreted as a Pearson  $r$  (McNemar, 1966), the significance of the multiple  $R$ 's was determined by reference to Guilford's (1965) table of significant correlation coefficients for varying numbers of predictors.

Double Cross-Validation Procedure. According to Guilford (1954), multiple regression analysis produces an inflated predictive value of tests due to the capitalization on chance, therefore, he suggested that "shrinkage" should be determined by cross-validation on a new sample. Mosier (1951) however, indicated that the best method of obtaining an unbiased measurement of predictive effectiveness is the double cross-validation procedure. Therefore, in order to determine what shrinkage might occur in predicting shading, a double cross-validation was performed with just the Degree of Shading total H-T-P score as the criterion.

The first step in the double cross-validation procedure was to divide the total sample ( $n = 367$ ) into two random subsamples (A and B) of 183 subjects each (one subject was randomly excluded from Sample A in order to keep the numbers equal). Next, separate multiple regression equations were computed on Sample A and Sample B. Subsequently, the B weights (i.e., raw score regression weights) from Sample A were substituted in Sample B; likewise, the B weights from Sample B were substituted in Sample A. The constants for Samples A and B remained the same, respect-

ively. Finally, multiple  $R$ 's were computed with the substituted weights.<sup>6</sup> Significance of the new, cross-validated  $R$ 's was tested in Guilford's (1965) table of significant correlations.

Sex as a Moderator. Since there were many sex differences found in this study as well as reported in the literature in regard to shading, it was felt that the possibility of sex acting as a moderator of shading be determined. A moderator variable is in essence a third variable, which is uncorrelated with both the predictor and criterion variables, but which influences the combined predictor-criterion relationship (Zedeck, 1971). In order to check for this possibility, it was necessary to compute multiple  $R$ 's separately for each sex. To demonstrate a moderator effect, according to Zedeck (1971), the subgroup multiple  $R$ 's should meet the following three criteria:

(a) Significantly different coefficients between subgroups; that is  $r_{xy}$  for Subgroup 1 is significantly different from  $r_{xy}$  for Subgroup 2; (b) patterns of validity coefficients reveal some coefficients to be significantly different from zero; that is  $r_{xy}$  for Subgroups 1 and 2 is significantly different from zero, but  $r_{xy}$  for Subgroup 3 is not significantly different from zero; and (c) the validity coefficient of a subgroup is different from the validity coefficient of the total group; that is  $r_{xy}$  for Subgroup 1 is greater than  $r_{xy}$  for the total group, whereas  $r_{xy}$  for Subgroup 2 is equal to or less than  $r_{xy}$  for the total group. (p.303)

To test the significance of the difference between subgroups, the multiple  $R$ 's were converted to Fisher  $Z$ 's and the standard error of

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<sup>6</sup> Appreciation is expressed to Dr. Olgierd Porebski for furnishing his program and processing this double cross-validation analysis.

the difference was obtained in the usual manner (McNemar, 1966). Significance of the multiple  $\underline{R}$ 's was tested by reference to Guilford's (1965) table of significant correlation coefficients. Although Zedeck (1971) reported not knowing a formula to test the latter criterion of demonstrating differential validities, Dayhaw suggested to McInnis (1972) a formula derived by analogy with formulas dealing with part-whole differences. Following is Dayhaw's formula (McInnis, 1972) which is used to test the difference between a total sample multiple  $\underline{R}$  and a subsample multiple  $\underline{R}$ :

$$R_s = \frac{1 - R_t^2}{\sqrt{N_s - 1}} \sqrt{\frac{N_t - N_s}{N_t - 1}}$$

where  $R_t$  = multiple R for the total group

$N_t$  = number in total group

$N_s$  = number in subgroup

This formula yields the standard error of the difference between a multiple  $\underline{R}$  of a subgroup and a multiple  $\underline{R}$  of the total group containing the subgroup (Carver, 1974; McInnis, 1972). The test of difference ( $\underline{t}$  test) is then computed in the regular manner (Guilford, 1965).

Validity of the obtained male-female regression weights was determined by double cross-validation analyses within the Male and Female samples.<sup>7</sup> For each sex, two random subgroups were selected ( $\underline{n}$  = 71 and 112,

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<sup>7</sup> Appreciation is expressed to Mr. Herb Taylor, Manager, Applications Department of the University of Ottawa's Computing Centre, and to Miss Rose Doherty of the Royal Ottawa Hospital for their assistance in these double cross-validation analyses.

for the Male and Female subgroups, respectively) and then separate multiple regression equations were computed for all four sex-subgroups. The B weights for the respective samples were then applied to the opposite subgroup within each sex. Multiple  $R$ 's were then recomputed and tested for the amount of shrinkage in the usual manner (Guilford, 1965; McNemar, 1966).

Factor Analysis of the Quality Scales. Since the attempt to measure the Quality of Shading was an exploratory part of this research, factor analysis was performed on the Quality of Shading Scales to determine the factors influencing the judges ratings. A classical factor analysis--with iteration and rotation to a varimax orthogonal solution--was computed to yield the factors of Quality of Shading. However, due to the small size of sample ( $n = 70$ ), the results are presented as being suggestive only.

## Chapter III

### RESULTS

This chapter presents the results of all the statistical analyses performed. Indicated first, are the obtained interrater reliability coefficients for the criterion measures. The test-retest reliability coefficients for both the criterion and predictor measures are unfurled next. Following this is a presentation of the descriptive statistics of the criterion and predictor variables. The results of the tests of the hypotheses are then elaborated, and finally, the results of all the subsequent statistical analyses are presented.

#### Interrater Reliabilities on the Criterion Measures

In order to judge the accuracy of the criterion measures, interrater reliabilities are reported for all three categories of shading: (a) Incidence, (b) Degree, and (c) Quality.

Interrater reliability estimates of the Incidence of Shading were obtained by computing the average per cent agreement among all three raters (Marzolf & Kirchner, 1970). For the other two criterion categories, Degree and Quality of Shading, the Ebel interrater reliability formula (Guilford, 1954), an intra class correlation, was employed.

The interrater reliabilities for all three criterion categories are reported in Table 2 for the House, Tree, and Person separately, as well as for the combined H-T-P. It can be observed from the obtained values

Table 2

Interrater Reliability Estimates for Incidence,  
Degree, and Quality of Shading

Shading Category	Drawing			
	House	Tree	Person	H-T-P
Incidence <sup>a</sup> ( <u>n</u> = 367)	96.9%	98.9%	99.4%	98.4%
Degree <sup>b</sup> ( <u>n</u> = 367)	.94	.92	.93	.94
Quality <sup>c</sup> ( <u>n</u> = 70)	.74	.84	.82	.87

<sup>a</sup> Average percent agreement among three raters.

<sup>b</sup> Average Ebel interrater reliability coefficients among three raters.

<sup>c</sup> Average Ebel interrater reliability coefficients among three raters.

that the reliability of rating all three categories of shading was high. Percentage of agreement among the three raters on Incidence of Shading was 96.9% or higher. Average Ebel interrater reliability coefficients for Degree of Shading were .92 or greater; and for Quality of Shading, the lowest average Ebel coefficient was .74. These findings show that shading can be reliably agreed upon as being present or absent in a drawing, but that further, it can be reliably quantified, and even "qualified", with a fairly high degree of consistency.

#### Test-Retest Reliabilities for Criterion Measures

Since it was also felt important to determine the reliability with which the shading characteristic was used by subjects in this study, the entire testing procedure was repeated on an available sample of 46 subjects from two classes--an introductory and an advanced psychology class. This sample consisted of 21 males and 25 females. Since there existed contradictions in the literature regarding sex differences on shading--as well as on some of the predictors--results were analyzed and are reported for the Total sample, as well as for Male and Female samples separately.

Incidence Reliability. For the Incidence of Shading category (Table 3) "test-retest reliability" is indicated for the Total, Male, and Female samples simply by the average percent agreement of Incidence of Shading occurring in both the test and retest drawings (Marzolf & Kirchner, 1970).

It can be seen that the consistency of the Incidence of Shading was fairly high as indicated by the average percent agreement for the indi-

Table 3

Average Percent Agreement for Incidence of Shading  
Between the Total ( $\underline{n} = 46$ ), Male ( $\underline{n} = 21$ ), and Female ( $\underline{n} = 25$ )  
Test-Retest Samples

Drawing	Sample		
	Total ( $\underline{n}=46$ )	Male ( $\underline{n}=21$ )	Female ( $\underline{n}=25$ )
House	76.1%	71.4%	80.0%
Tree	87.0%	81.0%	92.0%
Person	91.3%	85.7%	96.0%
H-T-P	63.0%	53.4%	72.0%

Note. Retest interval was approximately 5 weeks.

vidual drawings (see Table 3). All values were above 70%, but with females showing higher test-retest agreement. However, consistency as to the presence or absence of shading across all the drawings combined, i.e., H-T-P, was as low as 52.4% for the males, but as high as 72% for the females.

Degree Reliability. Test-retest reliability for the Total, Male and Female samples on the Degree of Shading category (Tables 4, 5, and 6) is reported as Pearson correlation coefficients. On the whole, the test-retest reliability coefficients for Degree of Shading were significant, but rather low (see Table 4). Reliability for Degree of Shading on the House drawings is as high as that of the total H-T-P,  $r(44) = .53$ ,  $p < .001$ . Person,  $r(44) = .46$ ,  $p < .01$ , and Tree,  $r(44) = .35$ ,  $p < .05$ , Degree of Shading reliabilities follow in that order. Reliability of the Quality of Shading was not measured.

If it is assumed that shading on a projective drawing is solely a measure of a trait characteristic (or characteristics), then shading on the H-T-P would certainly have to be considered not very reliable. However, if it were assumed that shading is a state variable, influenced by situational conditions, (i.e., a mood state indicator), then low test-retest reliability would be expected. This state variability condition would then be operating above and beyond the complexity and ambiguity of the task.

Table 4  
Means, Standard Deviations, and Test-Retest Reliability  
Coefficients (Pearson  $r$ 's) for a Sample of Subjects  
on Degree of Shading  
( $n = 46$ )

Drawing	Statistics			
	<u>M</u>	<u>SD</u>	<u>r<sub>tt</sub></u>	<u>t</u>
House				
Test	39.2	33.0	.53***	.26
Retest	38.0	31.8		
Tree				
Test	59.9	48.0	.35*	.07
Retest	59.3	47.8		
Person				
Test	36.7	35.2	.46**	1.93
Retest	27.6	21.2		
H-T-P				
Test	135.8	81.2	.53***	.97
Retest	124.9	73.1		

Note. Retest interval was approximately 5 weeks.

\*  $p < .05$   
 \*\*  $p < .01$   
 \*\*\*  $p < .001$

Table 5  
Means, Standard Deviations, and Test-Retest Reliability  
Coefficients (Pearson  $r$ 's) for a Sample of Male  
Subjects ( $n = 21$ ) on Degree of Shading

Drawing	Statistics			
	<u>M</u>	<u>SD</u>	<u><math>r_{tt}</math></u>	<u><math>t</math></u>
House				
Test	37.8	28.4	.50**	.87
Retest	32.1	30.2		
Tree				
Test	56.1	41.3	.45*	-.08
Retest	56.9	46.4		
Person				
Test	38.1	40.0	.25	1.86
Retest	21.9	14.5		
H-T-P				
Test	132.0	76.2	.45*	1.26
Retest	111.0	64.3		

Note. Retest interval was approximately 5 weeks.

\*  $p < .05$   
\*\*  $p < .01$

Table 6  
Means, Standard Deviations, and Test-Retest Reliability  
Coefficients (Pearson  $r$ 's) for a Sample of  
Female Subjects ( $n = 25$ ) on Degree of Shading

Drawing	Statistics			
	$\bar{M}$	$\bar{SD}$	$r_{tt}$	$t$
House				
Test	40.4	37.0	.55**	-.38
Retest	43.0	32.9		
Tree				
Test	63.0	53.5	.30	.14
Retest	61.2	49.7		
Person				
Test	35.6	31.5	.70***	.69
Retest	32.4	24.8		
H-T-P				
Test	139.0	86.5	.50**	.14
Retest	136.6	80.2		

Note. Retest interval was approximately 5 weeks.

\*  $\bar{p} < .05$   
 \*\*  $\bar{p} < .01$   
 \*\*\*  $\bar{p} < .001$

Reliability Differences. Further sex differences seem to enter the research when separate test-retest reliabilities are compared for males and females (see Tables 5 and 6). Generally, the females tended to yield higher reliabilities--with the greatest difference being on Person shading (.25 vs. .70). Although none of the differences were statistically significant (see Table 7) they no doubt contributed to the error variance.

Test-Retest Differences. Tables 4, 5, and 6, also show the results of t tests between test and retest Degree of Shading scores for the Total ( $n = 46$ ), Male ( $n = 21$ ) and Female ( $n = 25$ ) samples, respectively. As can be seen, the general trend is for retest drawings to contain less Degree of Shading. This tendency seems to further suggest that situational factors are affecting the shading--though none of the differences were significant ( $p > .05$ ).

#### Test-Retest Reliabilities for the Predictor Measures

Knowledge of the reliability of the predictor variables is not only important in assessing the validity of the research instruments, but also vital for a more thorough understanding of the results of this study.

Test-retest reliability coefficients were, of course, obtained on the same sample as described above, but it should be mentioned again that variation in number ( $n$ ) for a few instruments was due to some subjects having to leave the session in order to attend their next class. All other subjects were able to remain and complete all measures.

Table 7

Summary of Test-Retest Reliability Coefficients for  
 Total ( $\underline{n} = 46$ ), Male ( $\underline{n} = 21$ ), and Female ( $\underline{n} = 25$ )  
 Samples and Tests of Difference ( $\underline{t}$  tests)  
 Between Male and Female Test-Retest Reliability  
 Coefficients for Degree of Shading

Drawing	Sample			$\underline{t}^a$
	Total $\underline{r}_{tt}$ ( $\underline{n} = 46$ )	Male $\underline{r}_{tt}$ ( $\underline{n} = 21$ )	Female $\underline{r}_{tt}$ ( $\underline{n} = 25$ )	
House	.53***	.50**	.55**	.22
Tree	.35*	.45*	.30	-.55
Person	.46**	.25	.70***	1.93
H-T-P	.53***	.45*	.50**	.20

Note. Retest interval was approximately 5 weeks.

<sup>a</sup>  $\underline{df} = (\underline{n} - \underline{n}) - 3$ ; two-tailed table

\*  $\underline{p} < .05$

\*\*  $\underline{p} < .01$

\*\*\*  $\underline{p} < .001$

Predictor Reliabilities. Means, standard deviations, test-retest reliability coefficients, and tests of difference (t tests) of all predictor variables are presented in Tables 8, 9 and 10. Reliability coefficients for the four variables which are considered trait measures-- i.e., FA, DA, AAT and STAI-T, (Alpert & Haber, 1960; Spielberger, 1966)-- ranged from .61 to .92. With the exception of the Debilitating Anxiety scale, the other three reliabilities were greater than .70 and are acceptable according to Guilford (1965). For the 11 variables which may be considered state measures, the test-retest reliabilities range from .30 to .54. These relatively low correlations are predictable and expected of "true" state measures. The three drawing self-evaluation scales ranged from .68 to .78, and therefore, appear to be acting as trait measures. The reliability for formal drawing instruction, which is a self-report, demographic variable, was .87.

Test-Retest Differences. In Table 8, tests of difference (t tests) between the test and retest scores for the Total sample--in effect, pre- and posttest scores, indicated a significant drop in average overall drawing interest ( $p < .05$ ) as well as significant drops in average time spent on each drawing ( $p < .01$ ). Worry and Pre-Drawing Anxiety also reduced from the first to second drawing task. In Table 9, it can be observed that males dropped most in House Time,  $t(20) = 2.83$ ,  $p < .05$ , and Person Time,  $t(20) = 3.08$ ,  $p < .01$ ; whereas, in Table 10, females dropped

Table 8

Means, Standard Deviations, and Test-Retest Reliability  
Coefficients (Pearson  $r$ 's) for a Sample of Subjects  
on all Predictor Variables  
( $n = 46$ )

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Predictor Variables	$n$	$M$	$SD$	$r_{tt}$	$t$
1. Facilitating Anxiety					
Test	16	26.1	4.1	.72	.25
Retest	16	25.9	4.0		
2. Debilitating Anxiety					
Test	16	27.3	5.9	.61	-.40
Retest	16	27.8	4.8		
3. Achievement Anxiety					
Test	16	38.8	8.7	.77	.42
Retest	16	38.2	7.0		
4. State Anxiety					
Test	46	34.4	8.0	.30	-.66
Retest	46	35.4	9.2		
5. Trait Anxiety					
Test	18	39.4	9.4	.92	.52
Retest	18	37.7	9.8		
6. Worry					
Test	46	8.3	3.1	.54	2.72**
Retest	46	7.2	2.4		
7. Emotionality					
Test	46	6.4	1.9	.34	1.26
Retest	46	6.0	1.8		
8. Pre-Drawing Anxiety					
Test	46	14.7	4.5	.49	2.40*
Retest	46	13.2	3.7		
9. Drawing Self-Evaluation					
Test	46	3.2	1.4	.78	-1.44
Retest	46	3.4	1.4		
10. Drawing Task Evaluation					
Test	46	3.4	1.4	.68	-.60
Retest	46	3.5	1.4		
11. Total Drawing Evaluation					
Test	46	6.6	2.8	.76	-1.06
Retest	46	6.9	2.7		
12. Drawing Interest Before					
Test	46	4.1	1.9	.50	2.82**
Retest	46	3.3	1.9		
13. Drawing Interest During					
Test	46	5.0	1.7	.34	2.26*
Retest	46	4.3	1.9		
14. Drawing Interest After					
Test	46	4.5	2.0	.43	2.25*
Retest	46	3.8	1.9		
15. Total Drawing Interest					
Test	46	13.6	4.9	.48	2.86**
Retest	46	11.4	5.2		
16. Formal Drawing Instruction					
Test	46	1.8	1.0	.87	1.23
Retest	46	1.7	1.1		
17. House Time					
Test	46	9.4	3.6	.53	4.54***
Retest	46	7.1	3.4		
18. Tree Time					
Test	46	6.1	3.2	.47	3.01**
Retest	46	4.6	3.3		
19. Person Time					
Test	46	3.7	3.5	.30	3.77***
Retest	46	6.5	3.1		
20. Age					
Test	46	20.8	3.4	.99	-1.35
Retest	46	20.9	3.5		

Note. Retest interval was approximately 5 weeks.

$df = (n - 1)$   
\*  $p < .05$   
\*\*  $p < .01$   
\*\*\*  $p < .001$

Table 9

Means, Standard Deviations, and Test-Retest Reliability Coefficients (Pearson  $r$ 's) for a Male Sample of Subjects ( $n = 21$ ) on all Predictor Variables

Predictor Variables	$n$	$M$	$SD$	$r_{tt}$	$t$
1. Facilitating Anxiety					
Test	6	26.4	3.9	.81	.39
Retest	6	26.0	3.1		
2. Debilitating Anxiety					
Test	6	28.6	5.3	.39	-.60
Retest	6	30.2	5.4		
3. Achievement Anxiety					
Test	6	37.8	7.9	.65	.87
Retest	6	35.8	8.0		
4. State Anxiety					
Test	21	36.3	8.4	.28	.00
Retest	21	36.3	10.2		
5. Trait Anxiety					
Test	5	39.2	7.8	.90	.09
Retest	5	39.0	9.6		
6. Worry					
Test	21	8.7	3.4	.51	1.63
Retest	21	7.6	2.5		
7. Emotionality					
Test	21	6.2	1.8	.14	.58
Retest	21	5.9	1.7		
8. Pre-Drawing Anxiety					
Test	21	14.9	4.6	.42	1.38
Retest	21	13.5	3.7		
9. Drawing Self Evaluation					
Test	21	3.2	1.6	.68	-.72
Retest	21	3.4	1.5		
10. Drawing Task Evaluation					
Test	21	3.2	1.5	.47	-.58
Retest	21	3.4	1.5		
11. Total Drawing Evaluation					
Test	21	6.4	3.0	.61	-.68
Retest	21	6.8	3.0		
12. Drawing Interest before					
Test	21	3.4	1.8	.23	.00
Retest	21	3.4	1.3		
13. Drawing Interest During					
Test	21	4.8	1.7	.04	1.04
Retest	21	4.3	1.4		
14. Drawing Interest After					
Test	21	4.1	1.8	-.02	.57
Retest	21	3.8	1.5		
15. Total Drawing Interest					
Test	21	12.3	4.7	.05	.55
Retest	21	11.6	3.5		
16. Formal Drawing Instruction					
Test	21	1.7	1.0	.78	.64
Retest	21	1.6	1.1		
17. House Time					
Test	21	9.4	2.8	.44	3.73**
Retest	21	6.8	3.0		
18. Tree Time					
Test	21	6.7	3.6	.49	1.97
Retest	21	5.1	3.6		
19. Person Time					
Test	21	9.2	4.2	.30	3.56**
Retest	21	5.9	2.3		
20. Age					
Test	21	20.3	1.6	.98	-1.30
Retest	21	20.4	1.7		

Note: Retest interval was approximately 5 weeks.

df =  $(n - 1)$   
 \*  $p < .05$   
 \*\*  $p < .01$   
 \*\*\*  $p < .001$

Means, Standard Deviations, and Test-Retest Reliability Coefficients (Pearson  $r$ 's) for a Female Sample of Subjects ( $n = 25$ ) on all Predictor Variables

Predictor Variables	$n$	$M$	$SD$	$r_{tt}$	$t$
1. Facilitating Anxiety					
Test	10	25.8	4.3	.70	-.09
Retest	10	25.9	4.6		
2. Debilitating Anxiety					
Test	10	26.2	6.2	.73	-.07
Retest	10	26.3	3.9		
3. Achievement Anxiety					
Test	10	39.7	9.5	.87	.06
Retest	10	39.6	6.4		
4. State Anxiety					
Test	25	32.7	7.4	.29	-1.04
Retest	25	34.7	8.3		
5. Trait Anxiety					
Test	13	39.6	10.6	.96	2.80*
Retest	13	37.2	10.3		
6. Worry					
Test	25	8.1	2.9	.56	2.38*
Retest	25	6.9	2.2		
7. Emotionality					
Test	25	6.6	2.0	.47	1.22*
Retest	25	6.1	1.9		
8. Pre-Drawing Anxiety					
Test	25	14.5	4.5	.55	1.83
Retest	25	13.0	3.9		
9. Drawing Self Evaluation					
Test	25	3.2	1.3	.90	-1.68
Retest	25	3.4	1.2		
10. Drawing Task Evaluation					
Test	25	3.6	1.4	.91	.00
Retest	25	3.6	1.2		
11. Total Drawing Evaluation					
Test	25	6.8	2.6	.93	-.88
Retest	25	7.0	3.0		
12. Drawing Interest Before					
Test	25	4.6	1.8	.71	4.07***
Retest	25	3.3	2.2		
13. Drawing Interest During					
Test	25	5.2	1.8	.51	1.76
Retest	25	4.5	2.1		
14. Drawing Interest After					
Test	25	4.7	2.1	.67	2.01
Retest	25	4.0	2.1		
15. Total Drawing Interest					
Test	25	14.6	5.0	.74	3.54**
Retest	25	11.7	5.9		
16. Formal Drawing Instruction					
Test	25	1.8	1.0	.95	-1.41
Retest	25	1.9	1.1		
17. House Time					
Test	25	9.4	4.2	.58	2.82**
Retest	25	7.3	3.7		
18. Tree Time					
Test	25	5.6	2.8	.41	2.21*
Retest	25	4.2	2.9		
19. Person Time					
Test	25	8.2	2.8	.41	1.66
Retest	25	7.0	3.6		
20. Age					
Test	25	21.2	4.4	.99	.00
Retest	25	21.2	4.5		

Note. Retest interval was approximately 5 weeks.

$df = (n - 1)$   
 \*  $p < .05$   
 \*\*  $p < .01$   
 \*\*\*  $p < .001$

significantly on Drawing Interest Before,  $t(24) = 2.24, p < .05$ ; Total Drawing Interest,  $t(24) = 3.54, p < .01$ ; House Time,  $t(24) = 2.82, p < .01$ ; and Tree Time,  $t(24) = 2.21, p < .05$ . Females also dropped on Worry score,  $t(24) = 2.38, p < .05$ , and Trait Anxiety,  $t(12) = 2.80, p < .05$ . With the exception of Trait Anxiety, all of these measures can be considered state variables.

Reliability Differences. Again in a comparison between male and female reliabilities (see Table 11), females generally were more reliable. These differences were significant for the three drawing evaluation scales, three of the four interest scales, and also for the scale of formal drawing instruction. With the exception of the latter variable, the other five variables seem to be acting more as state measures for males, but as trait measures for females. This higher consistency of responding for females may have possibly been due to a greater overall interest in participating in the research--if such a generalization may be made from their drawing interest scores.

With these significant sex differences in the reliabilities of some predictor variables, as well as this same tendency on the criterion variables, statistical analyses were performed and are reported for the Total, Male, and Female samples, separately.

### Descriptive Statistics of the Criterion Variables

Incidence of Shading. Table 12 shows the percentage of Incidence of Shading for the Total, Male and Female samples, and tests of difference

Table 11

Summary of Test-Retest Reliability Coefficients for Total, Male and Female Samples and Tests of Difference ( $t$  tests) between Male and Female Test-Retest Reliability Coefficients for Predictor Variables

Predictor Variables	Total $r_{tt}^a$ ( $n = 46$ )	Male $r_{tt}$ ( $n = 21$ )	Female $r_{tt}$ ( $n = 25$ )	$t^b$
1. Facilitating Anxiety	.72**	.81*	.70*	.38
2. Debilitating Anxiety	.61*	.39	.73*	-.75
3. Achievement Anxiety	.77***	.65	.87***	-.81
4. State Anxiety	.30*	.23	.29	-.03
5. Trait Anxiety	.92***	.90*	.96***	-.61
6. Worry	.54***	.51*	.56**	-.22
7. Emotionality	.34*	.14	.47*	-1.16
8. Pre-Drawing Anxiety	.49***	.42	.55**	-.54
9. Drawing Self-Evaluation	.78***	.68***	.90***	-2.02*
10. Drawing Task Evaluation	.68***	.47*	.91***	-3.20**
11. Total Drawing Evaluation	.76***	.61**	.93***	-2.99**
12. Drawing Interest Before	.50***	.23	.71***	-2.06*
13. Drawing Interest During	.34*	.04	.51*	-1.64
14. Drawing Interest After	.43**	-.02	.67***	-2.61*
15. Total Drawing Interest	.48**	.05	.74***	-2.83**
16. Formal Drawing Instruction	.87***	.78***	.95***	-2.47*
17. House Time	.53***	.44*	.58**	-.60
18. Tree Time	.47**	.49*	.41	.32
19. Person Time	.30*	.30	.41	-.40
20. Age	.99***	.98***	.99***	-1.10

Note. Retest interval was approximately 5 weeks.

<sup>a</sup>  $df = (n - 2)$ ; two-tailed

<sup>b</sup>  $df = (\underline{n} + \underline{n}) - 2$ ; two-tailed

\*  $\frac{p}{p} < .05$

\*\*  $\frac{p}{p} < .01$

\*\*\*  $\frac{p}{p} < .001$

Table 12  
 Percentage of Incidence of Shading and Tests of  
 Difference ( $\chi^2$ ) Between Male ( $\underline{n}=142$ )  
 and Female ( $\underline{n}=225$ ) Samples

Drawing	Sample			$\chi^{2a}$
	Total ( $\underline{n}=367$ )	Male ( $\underline{n}=142$ )	Female ( $\underline{n}=225$ )	
House				
Absent	4.4%	5.6%	3.6%	.47
Present	95.6%	94.4%	96.4%	
Tree				
Absent	7.4%	8.5%	6.7%	.19
Present	92.6%	91.5%	93.3%	
Person				
Absent	1.4%	2.8%	0.4%	2.10
Present	98.6%	97.2%	99.6%	
H-T-P				
Absent	0.0%	0.0%	0.0%	-
Present	100.0%	100.0%	100.0%	

<sup>a</sup> df = 1  
 \*  $p < .05$   
 \*\*  $p < .01$   
 \*\*\*  $p < .001$

( $\chi^2$ ) between males and females. It can be observed that some shading was present in all subjects' drawings, yet not in all their individual drawing -- i.e., House, Tree, or Person. It appears that shading is present more often on the Person drawing, and that House and Tree shading follow in that order. Although the females had slightly more shading present, from the  $\chi^2$  tests it can be observed that there was no statistically significant difference between the Incidence of Shading present in the drawings of the Male and Female samples.

Degree of Shading. In Table 13 are shown the means and standard deviations of the Degree of Shading scores for the Total, Male, and Female samples, and tests of difference (t tests) between the Male and Female samples. It can be seen that Degree of Shading was greatest in the Tree drawing, and that the House and Person drawings followed, respectively. Generally females had higher Degree scores on all drawings, yet none of these differences attained statistical significance (p < .05).

Quality of Shading. Table 14 contains the means and standard deviations of the Quality of Shading category for the Total, Male, and Female samples, as well as t-test results between the Male and Female samples. This table shows that, in general, Quality of Shading is greatest in Person drawings, with House and Tree drawings following in decreasing order. This Quality order reverses in the House and Person drawings for males and females, but these differences do not appear important. Females generally showed

Table 13  
Means and Standard Deviations, and Tests of Difference  
(t tests) Between Male ( $\underline{n} = 142$ ) and Female  
( $\underline{n} = 225$ ) Samples on Degree of Shading

Drawing	Sample			$\underline{t}^a$
	Total ( $\underline{n}=367$ )	Male ( $\underline{n}=142$ )	Female ( $\underline{n}=225$ )	
House				
Mean	43.0	41.0	44.4	-.79
SD	39.8	39.5	39.5	
Tree				
Mean	66.1	65.6	66.4	-.16
SD	49.5	52.6	47.6	
Person				
Mean	34.1	31.7	35.6	-1.19
SD	30.6	32.8	29.1	
H-T-P				
Mean	143.2	138.3	146.4	-.85
SD	88.8	90.8	87.6	

<sup>a</sup>  $\underline{df} = (\underline{n}_1 - \underline{n}_2) - 2$   
\*  $p < .05$   
\*\*  $p < .01$   
\*\*\*  $p < .001$

Table 14

Means and Standard Deviations, and Tests of Difference  
(t tests) Between Male (n = 35) and Female  
(n = 35) Samples on Quality of Shading

Drawing	Sample			<u>t</u> <sup>a</sup>
	Total ( <u>n</u> = 70)	Male ( <u>n</u> = 35)	Female ( <u>n</u> = 35)	
House				
Mean	123.9	121.0	126.7	-1.66
SD	14.4	15.8	12.5	
Tree				
Mean	113.6	112.8	114.4	- .34
SD	19.7	20.6	18.9	
Person				
Mean	125.2	120.4	130.0	-2.37*
SD	17.6	17.5	16.7	
H-T-P				
Mean	362.7	354.2	371.1	-1.68
SD	42.7	44.8	39.5	

$$^a \text{df} = (n_1 - n_2) - 2$$

\* p < .05

\*\* p < .01

\*\*\* p < .001

higher Quality of Shading for all three drawings. However, only for the Person Quality of Shading was this difference significant,  $t(68) = -2.37, p < .05$ .

Tables 15, 16, and 17 present the intercorrelation coefficients among Incidence, Degree, and Quality of Shading for the Total ( $n = 367$ ), Male ( $n = 142$ ), and Female ( $n = 225$ ) samples, respectively. Table 18 presents the stepwise tests of difference ( $t$  tests) between respective Male and Female intercorrelations.

Incidence Intercorrelations. It can be seen in Tables 16 and 17 that for the Incidence of Shading category, the intercorrelations among the House, Tree, and Person are different between the Male and Female samples, but only significantly so for the Person and Tree intercorrelations (see Table 18). For males, the order of intercorrelations is Tree-Person,  $\Phi(140) = .25$ ; House-Tree  $\Phi(140) = .14$ ; and House-Person,  $\Phi(140) = -.04$ , respectively. However, for females, this order changes to House-Tree,  $\Phi(223) = .24$ ; House-Person,  $\Phi(223) = -.01$ ; and Tree-Person,  $\Phi(223) = -.02$ . These differences in the interrelationship between the separate drawings may represent a differential stimulus pull of the drawings for each sex, but it may also reflect, the way in which males and females apportioned their time among the three drawings.

Degree Intercorrelations. The intercorrelation coefficients (Pearson  $r$ 's) among the Degree of Shading scores for the House, Tree, and Person



Table 16

Intercorrelation Coefficients<sup>a</sup> among Incidence, Degree, and Quality of Shading for the Male Sample ( $n = 142$ )

Shading Category	IHS	ITS	IPS	IHTP	DHS	DTS	DPS	DHTP	QHS	QTS	QPS	QHTP
1. IHS ( $n=142$ )	-											
2. ITS	.14	-										
3. IPS	-.04	.25**	-									
4. IHTP	-	-	-	-								
5. DHS ( $n=142$ )	.25**	.19*	.08	-	-							
6. DTS	.09	.38***	.17*	-	.42***	-						
7. DPS	.10	.13	.16	-	.27***	.12	-					
8. DHTP	.20*	.35***	.19*	-	.78***	.80***	.55***	-				
9. QHS( $n=35$ )	.39*	-	-	-	.05	-.09	-.08	-.06	-			
10. QTS	.22	-	-	-	-.14	.01	.09	-.04	.62***	-		
11. QPS	.05	-	-	-	-.14	-.19	.32	-.10	.44***	.52***	-	
12. QHTP	.26	-	-	-	-.10	-.10	.14	-.08	.81***	.88***	.79***	-

Note. A dash (-) in the diagonal represents unity, but a dash (-) within the table indicates that Incidence of Shading was present on all drawings and, therefore, a point-biserial correlation was impossible to compute.

<sup>a</sup> Point-biserial  $r$ 's or phi coefficients for Incidence; Pearson  $r$ 's for Degree and Quality.

For ( $n=142$ ; two-tailed):  $p < .05 = r \geq .17$

$p < .01 = r \geq .21$

$p < .001 = r \geq .27$

For ( $n=35$ ; two-tailed):  $p < .05 = r \geq .33$

$p < .01 = r \geq .42$

$p < .001 = r \geq .51$

Table 17

Intercorrelation Coefficients<sup>a</sup> among Incidence, Degree and Quality  
of Shading for the Female Sample ( $n = 225$ )

Shading Category	IHS	ITS	IPS	IHTP	QHS	DTS	DPS	DHTP	QHS	QTS	QPS	QHTP
1. IHS ( $n=225$ )	-											
2. ITS	.24***	-										
3. IPS	-.01	-.02	-									
4. IHTP	-	-	-	-								
5. DHS ( $n=225$ )	.21**	.09	.02	-	-							
6. DTS	.19**	.37***	-.04	-	.33***	-						
7. DPS	.10	.12	.08	-	.40***	.29***	-					
8. DHTP	.23***	.28***	.01	-	.77***	.79***	.67***	-				
9. QHS ( $n=35$ )	.43**	-	-	-	.51***	-.13	.02	.17	-			
10. QTS	.29	-	-	-	.14	-.19	-.14	-.09	.56***	-		
11. QPS	.25	-	-	-	-.01	.01	-.05	-.02	.39*	.55***	-	
12. QHTP	.38*	-	-	-	.22	-.13	-.08	.00	.75***	.89***	.81**	-

Note. A dash (-) in the diagonal represents unity, but a dash (-) within the table indicates that Incidence of Shading was present on all drawings and, therefore, a point-biserial correlation was impossible to compute.

<sup>a</sup> Point-biserial  $r$ 's or phi coefficients for Incidence; Pearson  $r$ 's for Degree and Quality.

For ( $n=225$ ; two-tailed):  
 $p < .05 = r \geq .13$   
 $p < .01 = r \geq .17$   
 $p < .001 = r \geq .22$

For ( $n=35$ ; two-tailed):  
 $p < .05 = r \geq .33$   
 $p < .01 = r \geq .42$   
 $p < .001 = r \geq .51$

Table 18

Stepwise Tests of Difference (t tests) between Male (n=142) and Female (n=225)  
Intercorrelation Coefficients

Shading Category	IHS	ITS	IPS	IHTP	DHS	DTS	DPS	DHTP	QHS	QTS	QPS	QHTP
1. IHS	-											
2. ITS	-.96	-										
3. IPS	-.28	2.55*	-									
4. IHTP	-	-	-	-								
5. DHS	.39	.94	.56	-	-							
6. DTS	-.94	.11	1.97*	-	.97	-						
7. DPS	.00	.09	.75	-	-1.36	-1.65	-					
8. DHTP	-.29	.72	1.69	-	.23	.25	-1.78	-				
9. QHS	-.44	-	-	-	-4.74***	.37	- .93	-2.14*	-			
10. QTS	-.69	-	-	-	2.61**	1.87	2.14*	.46	.37	-		
11. QPS	-1.90	-	-	-	1.21	-1.87	3.53***	-.74	.24	-.17	-	
12. QHTP	-1.24	-	-	-	-3.00**	.28	2.04*	-.74	.62	-.18	-.22	-

Note. Dashes (-) indicate instances in which comparisons were imposible.

\*  $p < .05$   
 \*\*  $p < .01$   
 \*\*\*  $p < .001$

drawings for the Total, Male and Female samples which are presented in Tables 15, 16, 17, indicate differences between the sexes. However, since none of the differences between the Male and Female intercorrelations (Table 18) is statistically significant ( $p < .05$ ), the Total sample gives an adequate representation of both sexes. Intercorrelations among the individual drawings are as follows: House-Tree,  $r(365) = .36$ , House-Person,  $r(365) = .34$ , Tree-Person,  $r(365) = .21$ . These positive, but low intercorrelations suggest that Degree of Shading is not highly consistent between the specific drawing tasks. This finding further suggests that different factors (variables) may be operating within each individual drawing.

Quality Intercorrelations. In Tables 15, 16, and 17, the intercorrelation coefficients (Pearson  $r$ 's) among the Quality of Shading scores for the House, Tree, and Person drawings for the Total, Male and Female samples, respectively, also indicate sex differences. But similarly, as it was for Degree of Shading, there are no significant differences between the male-female intercorrelations ( $p < .05$ ). Therefore, the Total intercorrelations are representative for both sexes. As can be seen, the House-Tree correlation,  $r(68) = .59$ , is highest; the Tree-Person correlation,  $r(68) = .52$ , is next; and the House-Person correlation,  $r(68) = .45$ , is lowest. As was stated for Degree of Shading, these intercorrelations, although higher, suggest that Quality of Shading throughout the three drawings is only moderately related, and suggest the possible operation of state factors (variables) between the different drawings.

Shading Intercorrelations. Tables 15, 16, and 17 also show the interrelationships among all three categories of shading (Incidence, Degree, and Quality) for the Total, Male and Female samples, respectively. Intercorrelations of the three categories of shading for the Total sample indicated generally that Incidence and Degree of Shading were positively related for corresponding drawings. The intercorrelations further showed that Incidence and Quality of shading were positively related, but that Degree and Quality of Shading were positive and significant only for the House drawing. For the other drawings, the relationships between Degree and Quality of Shading were nonsignificant, and even negative.

Tests of Sex Differences. In Tables 16 and 17, sex differences are shown on the House and Person drawings for Degree and Quality of Shading. For males, these two categories of shading are significantly positively related on the Person drawing,  $r(140) = .32, p < .05$ ; whereas for females, only Degree and Quality of shading are significantly related on the House drawing,  $r(223) = .51, p < .001$ . Table 18, which reports the  $t$  values, indicates a significant male-female difference for Degree and Quality of Shading on these two drawings--i.e., House,  $t = -4.74, p < .001$ , and Person,  $t = 3.53, p < .001$ ).

### Descriptive Statistics of the Predictor Variables

Mean Differences. Table 19 presents the means and standard deviations for the Total, Male and Female samples, as well as tests of difference ( $t$

Table 19

Means, Standard Deviations, and Tests of Difference (t tests)  
Between Males (n=142) and Females (n=225)  
Samples on all Predictor Variables

90

Predictor Variables	Total	Males	Females	t <sup>a</sup>
1. Facilitating Anxiety				
Mean	26.9	27.0	26.9	.18
SD	5.1	5.2	5.1	
2. Debilitating Anxiety				
Mean	26.7	26.9	26.5	.59
SD	6.3	6.4	6.2	
3. Achievement Anxiety				
Mean	40.2	40.1	40.3	-.09
SD	10.3	10.5	10.1	
4. State Anxiety				
Mean	35.6	35.1	35.8	-.69
SD	9.4	8.6	9.9	
5. Trait Anxiety				
Mean	38.7	37.4	39.5	-2.22*
SD	8.8	8.3	9.1	
6. Worry				
Mean	7.8	7.8	7.9	.00
SD	3.1	3.2	3.0	
7. Emotionality				
Mean	6.0	6.1	6.0	.51
SD	1.8	2.0	1.7	
8. Pre-Drawing Anxiety				
Mean	13.9	14.0	13.8	.43
SD	4.3	4.6	4.1	
9. Drawing Self Evaluation				
Mean	3.4	3.4	3.5	-.70
SD	1.3	1.4	1.1	
10. Drawing Task Evaluation				
Mean	3.6	3.6	3.6	.00
SD	1.2	1.3	1.1	
11. Total Drawing Evaluation				
Mean	7.0	7.0	7.0	.00
SD	2.4	2.6	2.3	
12. Drawing Interest Before				
Mean	4.0	3.8	4.2	-2.24*
SD	1.6	1.6	1.7	
13. Drawing Interest During				
Mean	5.0	4.8	5.2	-2.33*
SD	1.6	1.6	1.6	
14. Drawing Interest After				
Mean	4.3	4.1	4.4	-1.52
SD	1.8	1.9	1.8	
15. Total Drawing Interest				
Mean	13.4	12.8	13.8	-2.12*
SD	4.4	4.5	4.3	
16. Formal Drawing Instruction				
Mean	1.9	1.8	2.0	-1.86
SD	1.0	1.0	1.0	
17. House Time				
Mean	9.7	9.8	9.7	.27
SD	3.4	3.5	3.4	
18. Tree Time				
Mean	5.8	5.7	5.9	-.62
SD	3.0	3.0	3.0	
19. Person Time				
Mean	19.5	9.0	9.9	-2.52*
SD	3.4	3.5	3.2	
20. Age				
Mean	20.7	20.9	20.5	1.40
SD	2.7	2.6	2.7	
21. IQ				
Mean	117.6	117.4	117.6	-.11
SD	9.6	11.8	8.3	

<sup>a</sup>  $df = (n_1 + n_2) - 2$ ; two-tailed

<sup>b</sup> For IQ: Total (n= 137); Males (n= 46); Females (n= 91).

\*  $p < .05$

tests) between the Male and Female samples on the predictor variables. As can be observed, sex differences were found on five predictor variables. Females were significantly higher than males on trait anxiety, drawing interest before, drawing interest during, total drawing interest, and on the time spent on the Person drawing. These differences were all significant at the  $p < .05$  level and further support the reporting of separate Male and Female sample results.

Predictor Intercorrelations. Tables 20, 21 and 22 display the intercorrelation coefficients (Pearson  $r$ 's) among all predictor variables for the Total, Male and Female samples, respectively. Table 23 presents the stepwise tests of difference ( $t$  tests) between the Male and Female intercorrelations on all the predictor variables. There were 14 differences significant at the  $p < .05$  level and one difference significant at the  $p < .01$  level. Although the number of significant differences is only slightly greater than expected by chance, almost half of these differences (7) were found on an instrument, the Achievement Anxiety Test, which has shown sex differences in previous research (Walsh, 1968, 1969; Walsh, Engbretson, & O'Brien, 1968). In any case, to be on the conservative side, it was decided to continue to analyze and report results separately by sex as well as for the Total sample.

#### Results of the Statistical Tests of the Null Hypotheses

This section presents the results of the tests of the research hypotheses stated in the null form. The level of probability for all tests was set at  $p < .05$ .

Table 20  
 Intercorrelation Coefficients (Pearson  $r$ 's) among all Predictor  
 Variables for the Total Sample  
 ( $n = 367$ )

Predictor Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
1. FA	-																						
2. DA	-.61	-																					
3. AA	.87	-.92	-																				
4. SA	-.15	.32	-.27	-																			
5. TA	-.28	.46	-.42	.53	-																		
6. W	-.16	.34	-.29	.18	.29	-																	
7. E	-.04	.16	-.12	.23	.20	.52	-																
8. PDA	-.14	.31	-.26	.23	.30	.93	.79	-															
9. DSE	.19	-.15	.19	-.01	-.13	-.30	-.07	-.25	-														
10. DTE	.18	-.16	.19	-.05	-.15	-.36	-.08	-.29	.85	-													
11. TDE	.19	-.16	.20	-.03	-.14	-.34	-.08	-.28	.97	.96	-												
12. DIB	.05	-.06	.06	-.06	-.08	-.12	-.05	-.11	.39	.38	.40	-											
13. DID	.14	-.12	.15	.08	-.02	-.09	-.03	-.08	.42	.40	.43	.60	-										
14. DIA	.14	-.10	.13	.00	-.04	-.09	-.04	-.08	.35	.35	.36	.58	.73	-									
15. TDI	.13	-.11	.13	.01	-.05	-.12	-.05	-.10	.44	.43	.45	.83	.89	.89	-								
16. FDI	.04	.01	.01	.07	-.00	-.14	-.02	-.11	.44	.37	.42	.16	.19	.16	.20	-							
17. HT	.08	-.00	.04	-.01	-.00	.02	-.07	-.02	.21	.18	.20	.19	.34	.30	.32	.07	-						
18. TT	-.06	.02	-.04	-.03	.04	-.01	-.06	-.04	.15	.12	.14	.12	.19	.12	.16	.16	.18	-					
19. PT	.02	.03	-.01	.05	.00	-.02	-.01	-.02	.06	.05	.06	.10	.15	.11	.14	-.07	.01	-.06	-				
20. AGE	.10	.01	.04	-.10	-.11	-.02	.07	.02	.01	-.01	-.00	-.10	-.09	-.09	-.11	.01	-.08	-.08	-.00	-			
21. SEX	.02	.03	-.01	-.04	-.11	.00	.03	.01	-.04	.00	-.02	-.10	-.13	-.08	-.12	-.05	.00	-.04	-.12	.07	-		
22. IQ <sup>a</sup>	.29	-.30	.33	-.21	-.17	-.21	-.16	-.22	-.00	.05	.02	.06	.12	.04	.08	.05	.01	-.04	-.12	-.10	-.01	-	

FA - Facilitating Anxiety    W - Worry    TDE - Total Drawing Evaluation    FDI - Formal Drawing Instruction  
 DA - Debilitating Anxiety    E - Emotionality    DIB - Drawing Interest Before    HT - House Time  
 AA - Achievement Anxiety    PDA - Pre-Drawing Anxiety    DID - Drawing Interest During    TT - Tree Time  
 SA - State Anxiety    DSE - Drawing Self-Evaluation    DIA - Drawing Interest After    PT - Person Time  
 TA - Trait Anxiety    DTE - Drawing Task Evaluation    TDI - Total Drawing Interest    AGE - Age  
 IQ - Otis IQ

Note. For total ( $n = 365$ ):  $p < .05 = r \geq .10$ ;  $p < .01 = r \geq .13$ ;  $p < .001 = r \geq .17$ ; (two-tailed).

<sup>a</sup>For IQ ( $n = 137$ ):  $p < .05 = r \geq .17$ ;  $p < .01 = r \geq .21$ ;  $p < .001 = r \geq .25$ ; (two-tailed).

Table 21  
 Intercorrelation Coefficients (Pearson  $r$ 's) among all Predictor  
 Variables for the Male Sample  
 ( $n = 142$ )

Predictor Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
1. FA	-																					
2. DA	-.62	-																				
3. AA	.88	-.92	-																			
4. SA	-.13	.25	-.22	-																		
5. TA	-.29	.49	-.44	.46	-																	
6. W	-.21	.40	-.34	.18	.34	-																
7. E	-.06	.24	-.17	.27	.31	.61	-															
8. PDA	-.16	.37	-.31	.24	.36	.94	.84	-														
9. DSE	.31	-.06	.20	.03	-.19	-.20	-.04	-.15	-													
10. DTE	.35	-.11	.24	-.04	-.22	-.26	-.06	-.20	.87	-												
11. TDE	.34	-.09	.22	-.01	-.21	-.23	-.05	-.18	.97	.96	-											
12. DIB	.10	-.03	.07	-.02	-.21	-.16	-.03	-.12	.44	.49	.48	-										
13. DID	.16	.02	.06	.15	-.01	-.04	.05	-.01	.38	.41	.41	.64	-									
14. DIA	.14	.04	.05	.07	.08	-.05	.02	-.02	.27	.31	.30	.58	.75	-								
15. TDI	.15	.02	.07	.08	-.05	-.10	.02	-.06	.41	.45	.44	.84	.90	.89	-							
16. FDI	.16	-.12	.15	.12	-.10	-.11	-.03	-.09	.35	.31	.34	.18	.13	.07	.14	-						
17. HT	.11	.06	.02	-.01	.03	.02	.06	.03	.24	.26	.26	.21	.37	.29	.33	.10	-					
18. TT	.02	-.04	.03	-.03	-.01	-.07	-.07	-.08	.12	.12	.13	.13	.16	.14	.16	.06	.25	-				
19. PT	.04	.04	-.01	.04	-.06	-.09	.01	-.06	.16	.20	.19	.20	.21	.18	.22	.03	.07	-.07	-			
20. AGE	.04	.01	.01	-.11	-.10	-.06	.05	-.02	.09	.03	.06	-.17	-.11	-.10	-.14	.09	-.07	-.14	.04	-		
21. IQ <sup>a</sup>	.37	-.36	.41	-.35	-.35	-.29	-.24	-.29	.00	.09	.05	.07	.16	.10	.12	-.07	.01	-.02	.01	-.19	-	

FA - Facilitating Anxiety      W - Worry      TDE - Total Drawing Evaluation      FDI - Formal Drawing Instruction  
 DA - Debilitating Anxiety      E - Emotionality      DIB - Drawing Interest Before      HT - House Time  
 AA - Achievement Anxiety      PDA - Pre-Drawing Anxiety      DID - Drawing Interest During      TT - Tree Time  
 ST - State Anxiety      DSE - Drawing Self-Evaluation      DIA - Drawing Interest After      PT - Person Time  
 TA - Trait Anxiety      DTE - Drawing Task Evaluation      TDI - Total Drawing Interest      AGE - Age  
 IQ - Otis IQ

Note. For total ( $n=142$ ):  $p < .05 = r \geq .16$ ;  $p < .01 = r \geq .22$ ;  $p < .001 = r \geq .26$ ; (two-tailed).

<sup>a</sup> IQ ( $n=46$ ):  $p < .05 = r \geq .29$ ;  $p < .01 = r \geq .35$ ;  $p < .001 = r \geq .45$ ; (two-tailed).

Table 22  
 Intercorrelation Coefficients (Pearson  $r$ 's) among all Predictor  
 Variables for the Female Sample  
 ( $n = 225$ )

Predictor Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
1. FA	-																					
2. DA	-.60	-																				
3. AA	.87	-.92	-																			
4. SA	-.16	.37	-.31	-																		
5. TA	-.27	.46	-.42	.56	-																	
6. W	-.14	.31	-.26	.18	.27	-																
7. E	-.04	.09	-.08	.21	.14	.45	-															
8. PDA	-.12	.27	-.22	.22	.26	.93	.75	-														
9. DSE	.11	-.21	.18	-.04	-.11	-.38	-.10	-.32	-													
10. DTE	.05	-.19	.14	-.06	-.10	-.44	-.10	-.36	.84	-												
11. TDE	.09	-.21	.17	-.05	-.11	-.42	-.10	-.36	.96	.96	-											
12. DIB	.03	-.08	.06	-.08	-.03	-.09	-.06	-.10	.35	.31	.34	-										
13. DID	.14	-.22	.21	.03	-.04	-.12	-.09	-.13	.44	.41	.44	.57	-									
14. DIA	.14	-.19	.19	-.04	-.13	-.12	-.08	-.12	.41	.39	.42	.58	.72	-								
15. TDI	.12	-.19	.18	-.04	-.08	-.13	-.09	-.13	.46	.42	.47	.82	.88	.89	-							
16. FDI	-.04	.08	-.07	.02	.00	-.15	-.00	-.11	.43	.38	.42	.13	.24	.24	.24	-						
17. HT	.05	-.04	.05	-.02	-.03	.03	-.17	-.05	.19	.12	.16	.17	.32	.30	.31	.12	-					
18. TT	-.10	.07	-.09	-.04	.06	.02	-.06	-.01	.17	.12	.15	.11	.21	.10	.16	.18	.14	-				
19. PT	.01	.02	-.01	.05	.02	.04	-.02	.02	-.02	-.06	-.04	.02	.09	.05	.06	-.08	-.03	-.06	-			
20. AGE	.13	.00	.06	-.09	-.10	.00	.08	.04	-.04	-.04	-.04	-.04	-.07	-.08	-.07	-.02	-.09	-.04	-.01	-		
21. IQ <sup>a</sup>	.23	-.25	.27	-.12	-.07	-.15	-.12	-.16	-.00	.01	.00	.04	.10	.00	.05	.14	.01	-.05	-.22	-.04	-	

FA - Facilitating Anxiety    W - Worry    TDE - Total Drawing Evaluation    FDI - Formal Drawing Instruction  
 DA - Debilitating Anxiety    E - Emotionality    DIB - Drawing Interest Before    HT - House Time  
 AA - Achievement Anxiety    PDA - Pre-Drawing Anxiety    DID - Drawing Interest During    TT - Tree Time  
 ST - State Anxiety    DSE - Drawing Self-Evaluation    DIA - Drawing Interest After    PT - Person Time  
 TA - Trait Anxiety    DTE - Drawing Task Evaluation    TDI - Total Drawing Interest    AGE - Age  
 IQ - Otis IQ

Note. For total ( $n=225$ ):  $p < .05 = r \geq .73$ ;  $p < .01 = r \geq .16$ ;  $p < .001 = r \geq .21$ ; (two-tailed).

<sup>a</sup> For IQ ( $n=91$ ):  $p < .05 = r \geq .21$ ;  $p < .01 = r \geq .26$ ;  $p < .001 = r \geq .31$ ; (two-tailed).

Table 23

Stepwise Tests of Difference ( $t$  tests) Between Male ( $n=142$ ) and Female ( $n=225$ ) Intercorrelation Coefficients (Pearson  $r$ 's) of all Predictor Variables

Predictor Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. FA	-																				
2. DA	-.27	-																			
3. AA	.21	-.27	-																		
4. SA	.30	-1.20	.88	-																	
5. TA	-.19	.26	-.24	-1.32	-																
6. W	-.66	.90	-.87	-.01	.66	-															
7. E	-.20	1.37	-.92	.52	1.60	2.02*	-														
8. PDA	-.45	1.05	-.85	.14	1.01	.82	2.37*	-													
9. DSE	1.99*	1.40	.10	.62	-.75	1.90	.59	1.74	-												
10. DTE	2.86*	.75	.94	.14	-1.21	1.86	.39	1.64	.94	-											
11. TDE	2.49*	1.14	.50	.40	-1.00	2.00*	.52	1.78	.67	1.12	-										
12. DIB	.72	.51	.04	.52	-1.73	-.67	.29	-.28	.94	1.97*	1.47	-									
13. DID	.15	2.32*	-1.37	1.13	.35	.71	1.30	1.10	-.63	.04	-.36	1.05	-								
14. DIA	-.01	2.14*	-1.33	.99	1.97*	.68	.98	.94	-1.38	-.86	-1.22	.10	.55	-							
15. TDI	.31	1.92	-1.04	1.02	.33	.32	.99	.71	-.57	.30	-.20	.31	1.26	.09	-						
16. FDI	1.97*	1.81	2.09*	.93	-.98	.37	-.25	.22	-.90	-.71	-.88	.45	-1.06	-1.60	-.91	-					
17. HT	.52	.96	-.33	.07	.54	-.10	2.09*	.78	.53	1.27	.90	.35	.50	-.14	.23	-.19	-				
18. TT	1.10	-.99	1.16	.06	-.60	-.84	-.04	-.61	-.46	.02	-.25	.15	-.49	.35	.01	1.17	1.11	-			
19. PT	.26	.17	.03	-.02	-.84	-1.13	.28	-.67	1.72	2.46*	2.15*	1.71	1.07	1.20	1.51	1.00	.94	-.07	-		
20. AGE	-.87	.06	-.47	-.24	-.02	-.55	-.30	-.49	1.20	.63	.96	-1.18	-.44	-.17	-.65	1.07	.20	-1.02	.44	-	
21. IQ <sup>a</sup>	.84	-.65	.86	-1.29	-1.56	-.79	-.65	-.73	.00	.45	.24	.15	.32	.51	.38	-1.12	.02	.12	1.22	-.81	-

FA - Facilitating Anxiety    W - Worry    TDE - Total Drawing Evaluation    FDI - Formal Drawing Instruction  
 DA - Debilitating Anxiety    E - Emotionality    DIB - Drawing Interest Before    HT - House Time  
 AA - Achievement Anxiety    PDA - Pre-Drawing Anxiety    DID - Drawing Interest During    TT - Tree Time  
 SA - State Anxiety    DSE - Drawing Self-Evaluation    DIA - Drawing Interest After    PT - Person Time  
 TA - Trait Anxiety    DTE - Drawing Task Evaluation    TDI - Total Drawing Interest    AGE - Age  
 IQ - Otis IQ

Note. For total ( $df = 365$ ):  $p < .05 = t \geq 1.97$ ;  $p < .01 = t \geq 2.59$ ;  $p < .001 = t \geq 3.30$

<sup>a</sup> Males ( $n = 46$ ); Females ( $n = 91$ ) ( $df = 135$ ):  $p < .05 = t \geq 1.98$ ;  $p < .01 = t \geq 2.62$ ;  $p < .001 = t \geq 3.33$

### Difference Hypotheses

Null hypotheses 1-3 dealt with the important consideration of sex differences between males and females on the three shading response categories. The results of the tests of the null hypotheses are presented as follows.

Null Hypothesis 1. This hypothesis, stating that there is no significant difference between males and females on Incidence of Shading, was analyzed with a  $\chi^2$  test for each separate drawing and H-T-P combined. As shown in Table 12, none of the  $\chi^2$  values for the House, Tree, Person drawings, separately, or for the total H-T-P, were significant. Therefore null hypothesis 1 is not rejected.

Null Hypothesis 2. This hypothesis, stating that there is no significant difference in Degree of Shading between males and females, was analyzed with a  $t$  test for all drawings, separately and combined (H-T-P). Table 13 indicates that although females generally produce higher Degree of Shading scores on all drawings, separately and totaled, these differences were not significant. Therefore, null hypothesis 2 was also not rejected.

Null Hypothesis 3. This hypothesis, stating that there is no significant difference between males and females in the Quality of Shading, was likewise analyzed with a  $t$  test for each separate drawing and combined H-T-P. As shown in Table 14, females produced a higher Quality of Shading

on all three drawings and total, yet only for shading in the Person drawing was the Quality of Shading significantly different ( $p < .05$ ). Therefore, null hypothesis 3 was not rejected for the House, Tree and total H-T-P, but was rejected for the Person drawing.

### Correlational Hypotheses

Null hypotheses 4 - 13 were stated only once, but referred to all three categories of shading: (a) Incidence, (b) Degree, and (c) Quality. The data were analyzed and are reported for the Total ( $n = 367$ ), Male ( $n = 142$ ) and Female ( $n = 225$ ) samples separately. Tests of significance for all correlational hypotheses were obtained by selecting the one- or two-tailed option in the SPSS PEARSON CORR program. Differences between males and females were tested by converting Pearson  $r$ 's to Fisher  $Z$ 's and obtaining the standard error of the difference according to the procedure indicated in McNemar (1966). Tables 24, 25 and 26 display the correlations between all predictor and criterion variables for the Total, Male and Female samples, respectively. Table 27 shows the significance of the difference between respective male-female correlations.

Null Hypothesis 4. This hypothesis states that there is no significant relationship between shading (a, b, and c) in the H-T-P and trait anxiety (STAI-T). For all three categories of shading on all three drawings for the Total sample, there was a general lack of significance; only for Incidence of Tree Shading  $r_{pb} (365) = -.10$ ,  $p < .05$ , 2-tailed, and

Table 24

Correlation Coefficients Between all Predictor Variables and Incidence  
(Point-Biserial  $r$ 's), Degree and Quality of Shading (Pearson  $r$ 's)  
for Total Sample ( $n = 367$ )

Predictor Variables	Incidence ( $n=367$ )				Degree ( $n=367$ )				Quality ( $n=70$ )			
	House	Tree	Person	H-T-P <sup>a</sup>	House	Tree	Person	H-T-P	House	Tree	Person	H-T-P
1. Facilitating Anxiety <sup>b</sup>	.14**	.07	-.03	-	.01	.09*	.01	.05	.30**	.36***	.31**	.40***
2. Debilitating Anxiety <sup>b</sup>	-.04	-.02	.00	-	-.10*	-.08	-.09*	-.12**	-.30**	-.30**	-.29**	-.36**
3. Achievement Anxiety	.09	.05	-.02	-	.07	.10*	.06	.10*	.34**	.37***	.33**	.42***
4. State Anxiety	.00	-.06	.09*	-	.11*	.04	.02	.08	-.36**	-.19	-.03	-.24*
5. Trait Anxiety	-.08	-.10*	.01	-	.02	-.08	-.07	-.06	-.26*	-.12	-.12	-.19
6. Worry	-.05	.02	.03	-	-.09*	-.08	-.06	-.10*	-.19	-.13	-.29**	-.24*
7. Emotionality	-.01	.02	.03	-	-.00	.00	-.04	-.01	-.09	-.11	-.17	-.15
8. Pre-Drawing Anxiety	-.04	.03	.04	-	-.07	-.06	-.06	-.08	-.17	-.14	-.28**	-.23*
9. Drawing Self-Evaluation <sup>b</sup>	.09*	.08	.00	-	.21***	.20***	.19***	.27***	.36**	.27*	.48***	.46***
10. Drawing Task Evaluation <sup>b</sup>	.08	.11*	-.00	-	.20***	.20***	.18***	.26***	.36**	.23*	.37***	.38***
11. Total Drawing Evaluation	.09	.10*	.00	-	.21***	.21***	.19***	.28***	.38**	.26*	.44***	.43***
12. Drawing Interest Before	.06	.00	.08	-	.13**	.12*	.17***	.18***	.19	.15	.39***	.28**
13. Drawing Interest During	.08	.06	.09	-	.25***	.16**	.22***	.28***	.12	.10	.30**	.21*
14. Drawing Interest After	.09	.08	.07	-	.19***	.10*	.20***	.21***	.04	.18	.25*	.21
15. Total Drawing Interest <sup>b</sup>	.09*	.06	.09*	-	.22***	.14**	.22***	.26***	.13	.17	.35***	.27*
16. Formal Drawing Instruction <sup>b</sup>	.04	-.03	.10*	-	.17***	.19***	.13**	.23***	.28**	.17	.24*	.27*
17. House Time	.15**	.14**	.11*	-	.29***	.17***	.03	.23***	.22*	.00	-.23*	-.02
18. Tree Time	-.04	.10*	.05	-	.05	.10*	.02	.09	.10	.41***	.16	.29*
19. Person Time	.03	-.03	.10*	-	-.07	.05	.17***	.06	-.23*	.12	.09	-.10
20. Age <sup>c</sup>	-.04	.01	-.06	-	-.04	.16**	-.01	.06	-.13	-.06	.06	-.04
21. Sex <sup>c</sup>	.09	.08	.07	-	-.04	-.01	-.06	-.04	-.20	-.04	-.28**	-.20
22. IQ ( $n=137$ )	.16	-.02	-.08	-	-.13	-.12	-.09	-.16	.24*	.23*	.29*	.31**

<sup>a</sup> Calculation of correlations impossible since all H-T-P's had shading present.

<sup>b</sup> Indicates that the significance of the predictor-criterion variable correlations were tested with one-tailed tests; all others were tested with two-tailed tests.

<sup>c</sup> Phi coefficients used with Incidence; point-biserial  $r$ 's used with Degree and Quality.

\* $p < .05$   
\*\* $p < .01$   
\*\*\* $p < .001$

Table 25

Correlation Coefficients Between all Predictor Variables and Incidence (Point Biserial  $r$ 's),  
Degree and Quality of Shading (Pearson  $r$ 's) for the Male Sample

Predictor Variables	Incidence ( $n=142$ )				Degree ( $n=142$ )				Quality ( $n=35$ )			
	House	Tree	Person	H-T-P <sup>a</sup>	House	Tree	Person	H-T-P	House	Tree	Person	H-T-P
1. Facilitating Anxiety <sup>b</sup>	.10	.01	-.06	-	.04	.06	.05	.07	.44**	.48**	.26	.48**
2. Debilitating Anxiety <sup>b</sup>	-.09	.02	.05	-	-.08	.02	-.09	-.05	-.28*	-.38*	-.26	-.38*
3. Achievement Anxiety	.00	-.01	-.06	-	.07	.02	.08	.07	.40*	.48**	.29	.48**
4. State Anxiety <sup>b</sup>	.07	-.02	.11	-	.19*	.20**	-.00	.20**	-.59***	-.50***	-.39**	-.59***
5. Trait Anxiety	-.16*	-.03	.01	-	-.03	-.05	-.14	-.09	-.33*	-.18	-.31	-.32
6. Worry <sup>b</sup>	.02	.07	.11	-	-.05	.03	-.07	-.03	-.21	-.20	-.25	-.26
7. Emotionality	.03	.08	.05	-	.12	.17*	-.08	.12	-.06	-.14	-.30*	-.20
8. Pre-Drawing Anxiety	.02	.08	.10	-	.02	.09	-.08	.03	-.16	-.19	-.28	-.25
9. Drawing Self-Evaluation <sup>b</sup>	.11	.12	-.01	-	.16*	.15*	.18*	.22**	.37*	.22	.29*	.35*
10. Drawing Task Evaluation <sup>b</sup>	.11	.17*	.01	-	.11	.17*	.14*	.19*	.45**	.24	.22	.36*
11. Total Drawing Evaluation	.11	.15	-.00	-	.14	.17*	.17*	.22**	.44**	.25	.27	.37*
12. Drawing Interest Before	.15	.14	.12	-	.02	.05	.20*	.11	.16	.16	.42*	.29
13. Drawing Interest During	.08	.08	.08	-	.16*	.09	.19*	.19*	-.04	-.04	.08	-.00
14. Drawing Interest After	.08	.12	.08	-	.05	-.02	.20*	.08	-.16	.08	.09	.02
15. Total Drawing Interest <sup>b</sup>	.12	.13	.10	-	.09	.04	.22**	.14*	-.02	.08	.23	.12
16. Formal Drawing Instruction <sup>b</sup>	.04	.12	.10	-	.23**	.30***	.10	.31***	.30*	.40**	.18	.36*
17. House Time	.12	.31***	.24**	-	.20**	.16*	-.07	.16*	.23	.04	-.16	.04
18. Tree Time	-.07	.18*	.09	-	.10	.09	.04	.11	.19	.47**	.22	.37*
19. Person Time	.05	-.01	.05	-	.01	.08	.26**	.14*	-.29*	-.23	.15	-.15
20. Age	.06	-.03	-.09	-	.06	.20**	-.13	.10	-.04	.09	.08	.06
21. IQ ( $n=46$ )	.18	-.01	-.12	-	-.16	-.16	.06	-.15	.31	.26	.30	.35*

<sup>a</sup> Calculation of Correlations impossible since all H-T-P's had shading present.

<sup>b</sup> Indicates that the significance of the predictor-criterion variable correlations were tested with one-tailed tests; all others were tested with two-tailed tests.

\* $p < .05$

\*\* $p < .01$

\*\*\* $p < .001$

Table 26

Correlation Coefficients Between all Predictor Variables and Incidence (Point-Biserial  $r$ 's),  
Degree and Quality of Shading (Pearson  $r$ 's) for the Female Sample

Predictor Variables	Incidence (n=225)				Degree (n=225)				Quality (n= 35)			
	House	Tree	Person	H-T-P <sup>a</sup>	House	Tree	Person	H-T-P	House	Tree	Person	H-T-P
1. Facilitating Anxiety <sup>b</sup>	.17**	.12*	.00	-	.00	.10	-.02	.05	.10	.24	.30*	.27
2. Debilitating Anxiety <sup>b</sup>	-.14*	-.04	-.07	-	-.12*	-.16**	-.09	-.17**	-.28*	-.20	-.24	-.29*
3. Achievement Anxiety	.17**	.08	.04	-	.07	.15*	.04	.13*	.21	.24	.30	.31
4. State Anxiety <sup>b</sup>	-.06	-.08	.07	-	.06	-.05	.03	.01	-.09	.12	.24	.13
5. Trait Anxiety	-.03	-.16*	-.01	-	.04	-.10	-.04	-.05	-.16	-.06	.12	-.03
6. Worry <sup>b</sup>	-.10	-.02	-.09	-	-.12*	-.15*	-.05	-.15*	-.13	-.02	-.35*	-.20
7. Emotionality	-.04	.01	.04	-	-.09	-.14*	.00	-.12	-.11	-.08	.01	-.07
8. Pre-Drawing Anxiety	-.09	-.01	-.05	-	-.13*	-.17**	-.04	-.16*	-.16	-.05	-.27	-.19
9. Drawing Self-Evaluation <sup>b</sup>	.07	.05	.03	-	.24***	.24***	.19**	.30***	.30*	.33*	.65***	.53***
10. Drawing Task Evaluation <sup>b</sup>	.05	.06	-.02	-	.26***	.22***	.22***	.31***	.25	.21	.53***	.40**
11. Total Drawing Evaluation	.07	.05	.00	-	.26***	.24***	.21**	.32***	.28	.28	.61***	.48**
12. Drawing Interest Before	-.01	-.10	.01	-	.20*	.16*	.14*	.22***	.23	.14	.32*	.28
13. Drawing Interest During	.07	.05	.09	-	.30***	.22***	.22***	.33***	.30	.23	.52***	.43**
14. Drawing Interest After	.09	.04	.05	-	.28***	.19**	.20**	.30***	.28	.30	.49**	.44**
15. Total Drawing Interest <sup>b</sup>	.06	.00	.06	-	.30***	.22***	.21***	.33***	.32*	.26	.52***	.44**
16. Formal Drawing Instruction <sup>b</sup>	.09	.07	.00	-	.14*	.11*	.15*	.17**	.19	-.07	.20	.11
17. House Time	.17**	.03	-.07	-	.34***	.17**	.11	.28***	.27	-.02	-.27	-.04
18. Tree Time	-.01	.04	-.00	-	.01	.11	.01	.07	.11	.39*	.27	.33*
19. Person Time	.01	-.06	.18**	-	-.13*	.03	.09	-.01	-.22	.01	-.06	-.09
20. Age	-.11	.04	-.01	-	-.09	.12	.07	.05	-.23	-.19	.06	-.14
21. IQ (n= 91)	.14	-.03	-.03	-	-.11	-.09	-.18	-.17	.10	.18	.28	.23

<sup>a</sup> Calculation of Correlations impossible since all H-T-P's had shading present.

<sup>b</sup> Indicates that the significance of the predictor-criterion variable correlations were tested with one-tailed tests; all others were tested with two-tailed tests.

\* $p < .05$   
 \*\* $p < .01$   
 \*\*\* $p < .001$

Table 27

Stepwise Tests of Difference ( $t$  tests) between Male ( $n=142$ ) and Female ( $n=225$ ) Intercorrelation Coefficients of Predictor Variables and Incidence (Point-Biserial  $r$ 's), Degree and Quality of Shading (Pearson  $r$ 's)

Predictor Variables	Incidence				Degree				Quality			
	House	Tree	Person	H-T-P <sup>a</sup>	House	Tree	Person	H-T-P	House	Tree	Person	H-T-P
1. Facilitating Anxiety	-.66	-1.02	-.56	-	.33	-.42	.68	.18	1.49	1.08	-.14	.97
2. Debilitating Anxiety	2.14*	.56	1.11	-	.35	1.77	-.06	1.11	-.03	-.81	-.05	-.41
3. Achievement Anxiety	-1.59	-.83	-.92	-	-.05	-1.30	.38	-.59	.84	1.10	-.02	.31
4. State Anxiety	1.20	.56	.37	-	1.15	2.32*	-.24	1.74	-2.36*	-2.70**	-2.64**	-3.26**
5. Trait Anxiety	-1.22	1.22	.18	-	-.65	.46	-.90	-.39	-.74	-.49	-1.76	-1.21
6. Worry	1.11	.83	1.86	-	.61	1.68	-.15	1.14	-.32	-.75	.46	-.28
7. Emotionality	.65	.65	.09	-	1.97	2.91*	-.76	2.23*	.22	-.24	-1.27	-.54
8. Pre-Drawing Anxiety	1.02	.83	1.39	-	1.32	2.46*	-.40	1.81	-.02	-.55	-.04	-.27
9. Drawing Self-Evaluation	.37	.65	-.37	-	-.71	-.77	-.08	-.72	.30	-.45	-1.93	-.89
10. Drawing Task Evaluation	.56	1.03	.28	-	-1.47	-.45	-.68	-1.10	.94	.15	-1.48	-.20
11. Total Drawing Evaluation	.37	.94	.00	-	-1.14	-.66	-.40	-.96	.70	-.13	-1.72	-.51
12. Drawing Interest Before	1.49	2.23*	1.02	-	-1.62	-1.03	.61	-1.05	-.29	.04	.45	.07
13. Drawing Interest During	.09	.28	-.09	-	-1.31	-1.27	-.33	-1.40	-1.44	-1.11	-1.99	-1.83
14. Drawing Interest After	-.09	.74	.28	-	-2.19*	-1.94	.02	-2.05**	-1.80	-.92	-1.76	-1.81
15. Total Drawing Interest	.56	1.21	.37	-	-2.02*	-1.67	.09	-1.79	-1.39	-.78	-1.35	-1.43
16. Formal Drawing Instruction	-.46	.47	.93	-	.90	1.88	-.48	1.38	.46	1.94	-.05	1.07
17. House Time	-.47	2.69**	2.91**	-	-1.42	-.08	-1.60	-1.23	-.15	.26	.46	.31
18. Tree Time	-.56	1.31	.83	-	.83	-.22	.30	.38	.35	.41	-.20	.18
19. Person Time	.37	.46	-1.22	-	1.28	.47	1.58	1.45	-.30	-.94	.82	-.24
20. Age	1.58	-.65	-.74	-	1.44	.75	-1.84	.47	.79	1.15	.06	.80
21. IQ <sup>b</sup>	.22	.11	-.49	-	-.29	-.37	1.30	.08	.88	.35	.12	.51

<sup>a</sup> Calculation of correlations impossible since all H-T-P's had shading present.

<sup>b</sup> For IQ: Male ( $n=146$ ); Female ( $n=91$ )

\* $p < .05$

\*\* $p < .01$

Quality of House Shading,  $r(68) = -.26$ ,  $p < .05$ , 2-tailed, were significant. The relationships between the respective variables in the male-female samples generally were similar, i.e., negative; but for the males, only the correlations between trait anxiety and Incidence of House Shading,  $r_{pb}(140) = -.16$ ,  $p < .05$ , 2-tailed, were significant. For the females, only Incidence of Tree shading was significant,  $r_{pb}(223) = -.16$ ,  $p < .05$ , 2-tailed. However, there were no significant differences between the Male and Female samples for the relationship between trait anxiety and the three categories of shading (see Table 27).

Null Hypothesis 5. This hypothesis states that there is no significant negative relationship between shading (a, b, and c) in the H-T-P and state anxiety (STAI-S). For the Total sample, only Incidence of Shading on the Person drawing,  $r_{pb}(365) = .09$ ,  $p < .05$ , 1-tailed, and Degree of Shading on the House drawing,  $r(365) = .11$ ,  $p < .05$ , 1-tailed, were significant. However, the relationships with Quality of Shading were negative and significant for the House,  $r(68) = -.36$ ,  $p < .01$ , 1-tailed, and total H-T-P,  $r(68) = -.24$ ,  $p < .05$ , 1-tailed. In comparing Male and Female sample differences, it can be seen that the males were contributing more to the Total results than the females. For the Male sample, the trends--i.e., positive with Degree of

of Shading, but negative with Quality of Shading--were similar to those of the Total, but males displayed all but the Person drawing significant for Degree of Shading and showed all drawings significant and negative on the Quality of Shading. No drawings, on Incidence of Shading for either males or females, were significant. On the Degree of Shading for females, the relationships were all nonsignificant. Likewise the relationship between state anxiety and Quality of Shading for females was nonsignificant. Nevertheless, Table 27 indicates a male-female difference in the relationship between state anxiety and Quality of Shading. For the males, there was a general negative relationship; but for females, this relationship was generally positive. As well, there was a significant difference between males and females for the relationships with Degree of Tree Shading (see Table 27).

Null Hypothesis 6. This hypothesis states that there is no significant negative relationship between shading (a, b, and c) in the H-T-P and debilitating anxiety (AAT-). For the Total, Male, and Female samples there was a general negative and significant relationship in the data across all categories of shading, except for Male Incidence of Shading. Here the relationship to debilitating anxiety was nonsignificant. The relationship with Quality of Shading for the Total sample produced significance ( $p < .01$ ) on all drawings; however, the males seem to be contributing more to these results. Females, on the other hand, seemed to show more significant negative relationships with the Degree of Shading

category. The only significant sex difference for these correlations resulted on the Incidence of House Shading item. Although males showed a nonsignificant positive relationships,  $r_{pb} (140) = .09$ ,  $p < .05$ , 1-tailed, and females showed a significant negative relationship,  $r_{pb} (223) = -.14$ ,  $p < .05$ , 1-tailed, both were significantly different from each other ( $p < .05$ ).

Null Hypothesis 7. This hypothesis states that there is no significant positive relationship between shading (a, b, and c) in the H-T-P and facilitating anxiety (AAT+). For the Total sample, as well as for the Male and Female samples, there was a general positive trend in the relationships. However, for the Total sample, only the relationships with Incidence of House Shading,  $r_{pb} (365) = .14$ ,  $p < .01$ , 1-tailed, and Degree of Tree Shading,  $r (365) = .09$ ,  $p < .05$ , 1-tailed, were significant for these two categories. The relationships between facilitating anxiety and Quality of Shading on all drawings and total H-T-P were positive and significant ( $p < .01$ ). Again it appears that the males were contributing more to the Total sample results--though no significant differences were obtained between males and females for any of the relationships (see Table 27).

Null Hypothesis 8. This hypothesis states that there is no significant negative relationship between shading (a, b, and c) in the H-T-P and worry. For the Total sample, as well as for the Male and Female samples, there was a general negative relationship between worry and shading. There were no significant relationships in the Incidence

category, but there were significant negative relationships with Degree of House Shading,  $r(365) = -.09$ ,  $p < .05$ , 1-tailed, and Degree H-T-P,  $r(365) = -.10$ ,  $p < .05$ , 1-tailed. For the Quality of Shading category, in the Total sample, the relationships with the Person drawing,  $r(68) = -.29$ ,  $p < .01$ , 1-tailed, and with the total H-T-P Quality of Shading,  $r(68) = -.24$ ,  $p < .05$ , 1-tailed, were significant. There were no significant differences between the Male and Female samples (see Table 27), but it appears that the trend is more consistent for the females. However, the correlations are higher in the female Degree of Shading category; but for males, correlations are higher in the Quality of Shading category.

Null Hypothesis 9. This hypothesis states that there is no significant positive relationship between shading (a, b, and c) in the H-T-P and general drawing self-evaluation (DSE). The relationship for these variables was positive and significant ( $p < .05$ ) for all drawings in the Degree and Quality categories for the Total, Male and Female samples. The Incidence category generally showed positive correlations, but the relationship was significant only with the House drawing in the Total sample,  $r_{pb}(365) = .09$ ,  $p < .05$ , 1-tailed. There were no significant sex differences (see Table 27), but females generally showed higher correlations with all categories of shading (see Tables 25 and 26).

Null Hypothesis 10. This hypothesis states that there is no significant positive relationship between shading (a, b, and c) in the H-T-P and

expectancy of success on a specific drawing task (DTE). Similarly, as with general drawing self-evaluation, the relationships of expectancy of success on the specific drawing tasks with all three categories of shading were positive and significant ( $p < .05$ ) for all drawings on Degree and Quality of Shading in the Total sample. Incidence of Shading for the Total sample was only significant on the Tree drawing  $r_{pb} (365) = .11$ ,  $p < .05$ , 1-tailed. Similarly, the trend was positive for the Male and Female samples, and there were no sex differences in the relationships; however, the female correlations were, in general, slightly higher (see Tables 25 and 26).

Null Hypothesis 11. This hypothesis states that there is no significant positive relationship between shading (a, b, and c) in the H-T-P and interest in a specific drawing task (TDI). In general, for the Total sample, there was a positive relationship shown with specific drawing interests (i.e., before, during, and after) and total drawing interest across all three categories of shading, but the number of significant relationships was greatest for the Degree of Shading (see Table 24). This same general pattern of relationships, i.e., positive, was shown by both sexes, but the females displayed a more consistent pattern of higher positive relationships, which was significantly different in four instances (see Table 27).

Null Hypothesis 12. This hypothesis states that there is no significant positive relationship between shading (a, b, and c) in the H-T-P and formal drawing instruction (FDI). Table 24 shows that for the Total sample,

there is a general positive relationship, which is particularly significant for the Degree and Quality categories. However, Incidence of Shading was only significant for the Person drawing,  $r_{pb} (365) = .10, p < .05$ . There were no statistically significant sex differences between the samples (see Table 27), but the significance of the correlations for the Male sample held across both Degree and Quality of Shading (see Table 25). On the other hand, for the Female sample, only the Degree of Shading relationships were significant. Therefore, formal drawing instruction seems to relate to male shading in a general way, whereas for females, it tends to relate more specifically to the Degree of Shading category.

Null Hypothesis 13. This hypothesis states that there is no significant relationship between shading (a, b, and c) in the H-T-P and intelligence (Otis IQ ). For the Total sample, it can be seen (see Table 24) that there was a general negative, but nonsignificant relationship with the Incidence and Degree of Shading categories. However, for Quality of Shading on all drawings, there was a significant positive relationship with intelligence ( $p < .05$ ). Curiously, Incidence of House Shading was positively related to intelligence,  $r_{pb} (365) = .16, p > .05$ , 2-tailed, but not significantly. Those same general trends--i.e., negative with Degree of Shading and positive with Quality of Shading--held throughout the Male and Female relationships. There were no statistically significant differences between the sexes in these relationships, but the males seem to be contributing most to the Total. In other words intelligence seems to have a stronger relationship with the shading of males, particularly their Quality of Shading.

### Subsequent Statistical Analyses

To describe the interrelationships within the data more fully and to determine any interactive or interdependent relationships among the predictor and criterion variables, exploratory subsequent statistical analyses were performed.

Tests of linearity (or nonlinearity ) were performed to determine the "best" measure of correlation between single predictor and criterion variable pairs. Results are shown for the Total sample, and the Male and Female samples, respectively.

Stepwise multiple regression analysis was performed to determine the best predictors among all the independent variables measured in this research. To determine the validity of the regression weights, a double cross-validation procedure was performed.

Due to the many sex differences in reliabilities on predictor variables, as well as in predictor-criterion interrelationships, sex was tested as a moderator variable and a double cross-validation procedure performed within each sex.

Finally, a factor analysis of the "experimental" Quality of Shading Scales was performed and is presented for consideration.

#### Test of Linearity of Regression

Linearity of regression was tested by comparing the Pearson  $r$  and eta coefficient for the regression of both Degree and Quality criterion measures on all predictor variables. The  $F$  test was made on the basis of

a one-way analysis of variance design (McNemar, 1966). Although regression can be computed in both directions, the interest of this research was only in the stated direction, i.e., the prediction of Y on X.

Degree Criteria. Presented in Tables 28, 29, and 30 are the Pearson  $r$ 's, eta coefficients, and  $F$  tests of difference between both coefficients for the Total, Male, and Female samples, respectively, on the Degree of Shading. It can be observed that 14 of the 84 predictor-criterion relationships on the Degree of Shading are better described by the nonlinear, eta coefficient.

The predictor variables involved are debilitating anxiety, state anxiety, drawing task evaluation, drawing interest before, total drawing interest, formal drawing instruction, and tree time. These relationships varied across the Total, Male and Female samples, as well as within the samples.

As is well known, the eta coefficient is usually higher than the Pearson  $r$ , but has no sign indicating directionality of the relationship. Examination of the plotted values of the interval means revealed that only the curve of the relationship of state anxiety and Degree of Person Shading in the Total sample was fairly regular and U-shaped--i.e., indicating more shading on the Person at both low and high levels of state anxiety. All other curves of nonlinear relationships on Degree of Shading were rather irregular, and therefore, difficult to describe.

Table 28

Tests of Linearity Between Pearson  $r$ 's and Eta Coefficients of the Degree of Shading  
on the Predictor Variables for the Total Sample ( $n = 367$ )

Predictor Variables	House				Tree				Person				H-T-P			
	$r$	Eta	$F$	$df$	$r$	Eta	$F$	$df$	$r$	Eta	$F$	$df$	$r$	Eta	$F$	$df$
1. Facilitating Anxiety	.01	.12	1.31	4,361	.07	.07	.07	4,361	.01	.05	.17	4,361	.05	.07	.30	4,361
2. Debilitating Anxiety	-.09	.16	1.55	4,361	-.09	.18	2.53*	4,361	-.04	.08	.45	4,361	-.10	.17	1.70	4,361
3. Achievement Anxiety	.05	.09	.52	4,361	.08	.10	.25	4,361	.04	.05	.13	4,361	.08	.10	.31	4,361
4. State Anxiety	.03	.10	.81	4,361	-.02	.11	1.13	4,361	-.02	.18	2.86*	4,361	-.00	.15	2.00	4,361
5. Trait Anxiety	.01	.08	.32	5,360	-.08	.12	.58	5,360	-.05	.10	.44	5,360	-.06	.08	.21	5,360
6. Worry	-.10	.13	.46	5,360	-.05	.12	.83	5,360	-.06	.13	.96	5,360	-.10	.12	.36	5,360
7. Emotionality	-.05	.08	.40	3,362	-.03	.07	.44	3,362	-.05	.07	.38	3,362	-.06	.07	.17	3,362
8. Pre-Drawing Anxiety	-.08	.11	.61	3,362	-.03	.12	1.60	3,362	-.04	.10	1.04	3,362	-.07	.10	.55	3,362
9. Drawing Self-Evaluation	.21	.22	.50	5,360	.20	.24	1.32	5,360	.19	.23	1.34	5,360	.27	.28	.70	5,360
10. Drawing Task Evaluation	.20	.24	1.38	5,360	.20	.24	1.27	5,360	.18	.35	7.23***	5,360	.26	.30	1.55	5,360
11. Total Drawing Evaluation	.22	.26	1.18	7,358	.21	.27	1.57	7,358	.18	.23	1.21	7,358	.28	.32	1.65	7,358
12. Drawing Interest Before	.13	.22	2.22	5,360	.12	.18	1.55	5,360	.17	.18	.22	5,360	.18	.22	1.03	5,360
13. Drawing Interest During	.25	.29	1.82	5,360	.16	.21	1.36	5,360	.22	.24	1.03	5,360	.28	.31	1.53	5,360
14. Drawing Interest After	.19	.22	.88	5,360	.10	.11	.22	5,360	.20	.68	.46	5,360	.21	.22	.29	5,360
15. Total Drawing Interest	.17	.18	1.51	1,364	.14	.16	1.61	1,364	.20	.20	.57	1,364	.22	.24	2.36	1,364
16. Formal Drawing Instruction	.17	.19	.76	3,362	.19	.24	2.90*	3,362	.13	.14	.24	3,362	.23	.25	1.43	3,362
17. House Time	.28	.29	.61	4,361	-	-	-	-	-	-	-	-	.21	.25	1.63	4,361
18. Tree Time	-	-	-	-	.14	.20	1.51	5,360	-	-	-	-	.13	.26	4.10**	5,360
19. Person Time	-	-	-	-	-	-	-	-	.19	.23	1.55	4,361	.08	.14	1.30	4,361
20. Age	.00	.09	.72	4,361	.15	.22	2.26	4,361	-.05	.14	1.54	4,361	.07	.15	1.70	4,361
21. IQ ( $n=137$ )	-.13	.17	.34	5,130	-.14	.22	.88	5,130	-.09	.16	.44	5,130	-.16	.23	.66	5,130

\* $p < .05$ \*\* $p < .01$ \*\*\* $p < .001$

Table 29

Tests of Linearity Between Pearson  $r$ 's and Eta Coefficients of the Degree of Shading  
on the Predictor Variables for the Male Sample ( $n=142$ )

Predictor Variables	House				Tree				Person				H-T-P			
	$r$	Eta	$F$	$df$	$r$	Eta	$F$	$df$	$r$	Eta	$F$	$df$	$r$	Eta	$F$	$df$
1. Facilitating Anxiety	.01	.14	.71	4,136	.06	.15	.69	4,136	-.02	.08	.19	4,136	.04	.13	.53	4,136
2. Debilitating Anxiety	.09	.23	.67	4,136	.03	.32	3.74**	4,136	-.04	.23	1.83	4,136	-.04	.28	2.91*	4,136
3. Achievement Anxiety	.06	.17	.83	4,136	.04	.11	.38	4,136	.01	.12	.50	4,136	.06	.11	.31	4,136
4. State Anxiety	.07	.21	1.44	4,136	.11	.27	2.24	4,136	.04	.22	1.62	4,136	.11	.24	1.61	4,136
5. Trait Anxiety	-.05	.14	.66	4,136	-.05	.14	.61	4,136	-.10	.14	.37	4,136	-.09	.16	.62	4,136
6. Worry	-.07	.21	1.38	4,136	.06	.15	.69	4,136	-.08	.13	.33	4,136	-.03	.17	.99	4,136
7. Emotionality	.03	.10	.62	2,138	.14	.15	.06	2,138	-.11	.13	.32	2,138	.06	.09	.37	2,138
8. Pre-Drawing Anxiety	-.02	.25	1.81	5,135	.12	.20	.76	5,135	-.08	.16	.53	5,135	.03	.21	1.25	5,135
9. Drawing Self-Evaluation	.15	.19	.43	4,136	.15	.20	.63	4,136	.14	.24	1.30	4,136	.21	.23	.43	4,136
10. Drawing Task Evaluation	.10	.17	.64	4,136	.17	.22	.69	4,136	.10	.29	2.71*	4,136	.18	.23	.80	4,136
11. Total Drawing Evaluation	.10	.13	.18	5,135	.14	.21	.62	5,135	.12	.24	1.26	5,135	.17	.18	.14	5,135
12. Drawing Interest Before	.02	.23	1.48	5,135	.05	.17	.76	5,135	.20	.29	1.38	5,135	.11	.23	1.28	5,135
13. Drawing Interest During	.16	.26	1.11	5,135	.09	.20	1.03	5,135	.19	.26	.96	5,135	.19	.25	.71	5,135
14. Drawing Interest After	.05	.18	.85	5,135	-.02	.12	.36	5,135	.20	.25	.65	5,135	.08	.16	.55	5,135
15. Total Drawing Interest	.08	.32	2.83*	5,135	.07	.22	1.27	5,135	.18	.30	1.76	5,135	.14	.32	2.53*	5,135
16. Formal Drawing Instruction	.21	.22	.44	2,138	.28	.33	2.39	2,138	.12	.24	3.24*	2,138	.30	.34	2.01	2,138
17. House Time	.19	.26	.86	5,135	-	-	-	-	-	-	-	-	.14	.28	1.74	5,135
18. Tree Time	-	-	-	-	.14	.25	1.20	5,135	-	-	-	-	.15	.34	2.89*	5,135
19. Person Time	-	-	-	-	-	-	-	-	.26	.36	2.31	4,136	.18	.25	1.12	4,136
20. Age	.11	.18	.62	5,135	.21	.27	.91	5,135	-.15	.21	.64	5,135	.11	.19	.67	5,135
21. IQ ( $n=46$ )	-.12	.28	.53	5,039	-.19	.36	.84	5,039	.12	.42	1.57	5,039	-.13	.29	.57	5,039

\* $p < .05$ \*\* $p < .01$

Table 30

Tests of Linearity Between Pearson  $r$ 's and Eta Coefficients of the Degree of Shading  
on the Predictor Variables for the Female Sample ( $n=225$ )

Predictor Variables	House				Tree				Person				H-T-P			
	$r$	Eta	$F$	$df$	$r$	Eta	$F$	$df$	$r$	Eta	$F$	$df$	$r$	Eta	$F$	$df$
1. Facilitating Anxiety	.02	.18	1.40	5,218	.10	.12	.20	5,218	-.01	.08	.26	5,218	.06	.12	.53	5,218
2. Debilitating Anxiety	-.10	.13	.42	4,219	-.17	.22	1.03	4,219	-.06	.10	.42	4,219	-.16	.20	.87	4,219
3. Achievement Anxiety	.07	.10	.24	4,219	.14	.18	.76	4,219	-.25	.12	.70	4,219	.13	.15	.38	4,219
4. State Anxiety	.02	.20	2.35	4,219	-.08	.17	1.27	4,219	-.02	.18	1.84	4,219	-.04	.23	2.97*	4,219
5. Trait Anxiety	.04	.12	.67	4,219	-.11	.16	.78	4,219	-.01	.17	1.67	4,219	-.05	.14	1.02	4,219
6. Worry	-.12	.23	1.27	7,216	-.14	.23	1.12	7,216	-.04	.19	1.12	7,216	-.14	.23	1.06	7,216
7. Emotionality	-.07	.13	.60	4,219	-.13	.15	.43	4,219	.02	.11	.67	4,219	-.10	.13	.40	4,219
8. Pre-Drawing Anxiety	-.11	.20	.70	9,214	-.15	.25	1.06	9,214	-.03	.18	.76	9,214	-.14	.23	.87	9,214
9. Drawing Self-Evaluation	.24	.26	.49	5,218	.23	.22	1.45	5,218	.19	.27	1.81	5,218	.30	.34	1.29	5,218
10. Drawing Task Evaluation	.26	.32	1.69	5,218	.22	.28	1.47	5,218	.22	.27	1.17	5,218	.31	.34	.84	5,218
11. Total Drawing Evaluation	.26	.29	1.03	11,212	.24	.32	1.04	11,212	.21	.34	1.51	11,212	.32	.42	1.80	11,212
12. Drawing Interest Before	.20	.33	2.27*	5,218	.16	.24	1.56	5,218	.14	.15	.20	5,218	.22	.26	.95	5,218
13. Drawing Interest During	.30	.31	1.03	5,218	.22	.26	.99	5,218	.22	.24	.43	5,218	.33	.35	.72	5,218
14. Drawing Interest After	.28	.38	.77	5,218	.19	.20	.25	5,218	.20	.22	.49	5,218	.20	.30	.15	5,218
15. Total Drawing Interest	.29	.17	1.27	11,212	.22	.28	.64	11,212	.21	.30	.95	11,212	.32	.36	.61	11,212
16. Formal Drawing Instruction	.13	.33	.79	3,220	.11	.17	-	3,220	.15	.21	1.71	3,220	.17	.19	.61	3,220
17. House Time	.32	.11	.51	4,219	-	-	-	-	-	-	-	-	.26	.32	2.22	4,219
18. Tree Time	-	-	-	-	.13	.16	2.32	1,222	-	-	-	-	.08	.10	2.56*	1,222
19. Person Time	-	-	-	-	-	-	-	-	.16	.19	.60	5,218	.04	.15	.89	5,218
20. Age	-.05	.26	.48	4,219	.11	.21	1.90	4,219	.04	.18	1.82	4,219	.05	.17	1.58	4,219
21. IQ ( $n=91$ )	-.09	.25	1.30	4,085	-.06	.22	1.00	4,085	-.14	.27	1.21	4,085	-.13	.30	1.67	4,085

\* $p < .05$

Quality Criteria. Similarly the predictor relationships with the Quality of Shading categories show 15 of the 84 relationships to be non-linear (see Tables 31, 32 and 33. As with the Degree of Shading, only one relationship curve, i.e., age and Quality of Tree Shading in the Total sample, was fairly regular (i.e., U-shaped). All other relationship curves were too irregular to describe in words.

According to Nunnally (1967), the correlating of two differently shaped distributions (i.e., non-normal distributions) has the effect of lowering the Pearson  $r$  and the tendency of producing nonlinear relationships. However, he further indicated that unless the two distributions deviate seriously in kurtosis and/or skewness (i.e., in opposite directions) the Pearson  $r$  gives an adequate, albeit an under estimated, indication of relationship. Inspection of Tables 34 and 35, indicating the kurtosis and skewness of the criterion and predictor variables, respectively, shows that these variables do not deviate seriously in opposite directions--particularly on skewness.

Although Guilford (1965) suggested that transformations may be performed upon non-bivariate-normal distributions--which may induce the conditions of normality and linearity--Ghiselli (1964) implied that unless there is sufficient theoretical and/or empirical justification to the contrary, then the obtained distributions and resulting relationships should be accepted rather than forced to fit the model of normality.

Consequently, since there were no seriously opposite, deviations between predictor and criterion distributions in regard to kurtosis and

Table 31

Tests of Linearity Between Pearson  $r$ 's and Eta Coefficients of the Quality of Shading  
on the Predictor Variables for the Total Sample ( $n=70$ )

Predictor Variables	House				Tree				Person				H-T-P			
	$r$	Eta	$F$	$df$	$r$	Eta	$F$	$df$	$r$	Eta	$F$	$df$	$r$	Eta	$F$	$df$
1. Facilitating Anxiety	.35	.44	1.38	4,64	.43	.51	1.64	4,64	.30	.36	.71	4,64	.44	.50	1.17	4,64
2. Debilitating Anxiety	-.28	.32	.40	4,64	-.26	.31	.51	4,64	-.26	.38	1.48	4,64	-.32	.35	.34	4,64
3. Achievement Anxiety	.33	.37	.84	4,64	.40	.47	1.33	4,64	.30	.48	2.87*	4,64	.42	.49	1.36	4,64
4. State Anxiety	-.38	.52	3.33*	4,64	-.20	.39	2.12	4,64	-.02	.45	4.06**	4,64	-.22	.47	3.65**	4,64
5. Trait Anxiety	-.30	.43	1.52	5,63	-.15	.34	1.34	5,63	-.16	.24	.44	5,63	-.23	.35	.97	5,63
6. Worry	-.20	.26	.47	4,64	-.08	.24	.87	4,64	-.28	.54	.82	4,64	-.22	.32	.94	4,64
7. Emotionality	-.13	.29	2.50	2,66	-.09	.24	1.82	2,66	-.18	.25	1.03	2,66	-.16	.30	2.28	2,66
8. Pre-Drawing Anxiety	-.16	.29	1.41	3,65	-.02	.26	1.62	3,65	-.17	.30	1.44	3,65	-.14	.30	1.73	3,65
9. Drawing Self-Evaluation	.36	.39	.33	5,63	.27	.32	.38	5,63	.48	.55	.30	5,63	.44	.48	.59	5,63
10. Drawing Task Evaluation	.36	.40	.44	5,63	.23	.26	.23	5,63	.37	.44	1.02	5,63	.38	.41	.43	5,63
11. Total Drawing Evaluation	.37	.44	.58	7,61	.26	.28	.08	7,61	.43	.46	.28	7,61	.42	.43	.09	7,61
12. Drawing Interest Before	.19	.39	1.74	5,63	.15	.23	.43	5,63	.35	.41	.71	5,63	.28	.38	1.06	5,63
13. Drawing Interest During	.12	.27	.80	5,63	.10	.25	.73	5,63	.30	.41	1.17	5,63	.21	.77	1.05	5,63
14. Drawing Interest After	.04	.13	.20	5,63	.18	.36	1.37	5,63	.26	.36	.92	5,63	.21	.82	1.27	5,63
15. Total Drawing Interest	.13	.17	.86	1,67	.15	.17	.49	1,67	.42	.42	.11	1,67	.29	.29	.02	1,67
16. Formal Drawing Instruction	.20	.30	.54	3,65	.17	.30	1.38	3,65	.28	.39	2.51	3,67	.27	.34	1.01	3,65
17. House Time	.23	.27	.33	4,64	-	-	-	-	-	-	-	-	.04	.25	1.08	4,64
18. Tree Time	-	-	-	-	.38	.41	.43	5,63	-	-	-	-	.26	.32	.44	5,63
19. Person Time	-	-	-	-	-	-	-	-	.14	.32	1.51	4,64	-.03	.16	.39	4,64
20. Age	-.22	.39	1.91	4,64	-.16	.41	2.76*	4,64	-.01	.35	2.28	4,64	-.15	.45	3.41*	4,64
21. IQ ( $n=70$ )	.22	.30	.52	5,63	.21	.42	2.06	5,63	.28	.42	1.53	5,63	.29	.44	1.70	5,63

\* $p < .05$ \*\* $p < .01$

Table 32

Tests of Linearity Between Pearson  $r$ 's and Eta Coefficients of the Quality of Shading  
on the Predictor Variables for the Male Sample ( $n=35$ )

Predictor Variables	House				Tree				Person				H-T-P			
	$r$	Eta	F	df	$r$	Eta	F	df	$r$	Eta	F	df	$r$	Eta	F	df
1. Facilitating Anxiety	.46	.60	1.66	4,29	.50	.58	1.01	4,29	.20	.47	1.68	4,29	.47	.59	1.38	4,29
2. Debilitating Anxiety	-.26	.30	.18	4,29	-.38	.44	.55	4,29	-.24	.52	2.15	4,29	-.35	.43	.55	4,29
3. Achievement Anxiety	.35	.68	4.48*	4,29	.46	.62	2.07	4,29	.21	.39	.94	4,29	.42	.62	2.48	4,29
4. State Anxiety	-.62	.70	1.50	4,29	-.48	.54	.60	4,29	-.32	.60	2.97*	4,29	-.57	.68	1.87	4,29
5. Trait Anxiety	-.29	.38	.54	4,34	-.07	.35	.98	4,29	-.20	.45	1.49	4,29	-.21	.41	1.09	4,29
6. Worry	-.19	.34	.69	4,34	-.10	.34	.90	4,29	-.16	.32	.64	4,29	-.18	.34	.72	4,29
7. Emotionality	-.06	.14	.27	2,31	-.06	.12	.17	2,31	-.30	.31	.09	2,31	-.16	.17	.01	2,31
8. Pre-Drawing Anxiety	-.17	.52	1.82	5,34	-.07	.48	1.66	5,28	-.17	.32	.47	5,26	-.16	.43	1.13	5,28
9. Drawing Self-Evaluation	.37	.47	1.11	3,30	.22	.36	.92	3,30	.29	.53	2.84	3,30	.35	.51	1.89	3,30
10. Drawing Task Evaluation	.45	.48	.28	3,30	.24	.36	.83	3,30	.22	.43	1.72	3,30	.36	.45	.92	3,30
11. Total Drawing Evaluation	.47	.56	.96	4,29	.28	.44	1.12	4,29	.33	.50	1.35	4,29	.42	.53	1.27	4,29
12. Drawing Interest Before	.16	.40	.91	5,28	.15	.48	1.52	4,29	.42	.55	1.05	5,28	.29	.54	1.61	5,28
13. Drawing Interest During	-.04	.37	1.14	4,29	-.04	.40	1.37	4,29	.08	.47	2.02	4,29	-.00	.44	1.76	4,29
14. Drawing Interest After	-.16	.21	.12	5,28	.08	.34	.72	5,28	.09	.40	.98	5,28	.02	.27	.45	5,28
15. Total Drawing Interest	.04	.36	.81	5,28	.08	.39	.98	5,28	.26	.48	.20	5,28	.15	.39	.86	5,28
16. Formal Drawing Instruction	.28	.36	.98	2,31	.38	.50	2.38	2,31	.21	.25	.33	2,31	.35	.42	.96	2,31
17. House Time	.22	.41	.78	5,28	-	-	-	-	-	-	-	-	.06	.39	.97	5,28
18. Tree Time	-	-	-	-	.37	.52	1.03	5,28	-	-	-	-	.27	.56	2.01	5,28
19. Person Time	-	-	-	-	-	-	-	-	.07	.33	.86	4,29	-.19	.30	.44	4,29
20. Age	-.10	.30	.50	5,28	-.04	.50	1.82	5,28	-.03	.45	1.42	5,28	-.06	.46	1.50	5,28
21. IQ ( $n=35$ )	.34	.42	.44	5,28	.24	.32	.27	5,28	.34	.56	1.62	5,28	.36	.47	.62	5,28

\* $p < .05$ \*\* $p < .01$

Table 33

Tests of Linearity Between Pearson  $r$ 's and Eta Coefficients of the Quality of Shading  
on the Predictor Variables for the Female Sample ( $n= 35$ )

Predictor Variables	House				Tree				Person				H-T-P			
	$r$	Eta	$F$	$df$	$r$	Eta	$F$	$df$	$r$	Eta	$F$	$df$	$r$	Eta	$F$	$df$
1. Facilitating Anxiety	.15	.35	.62	5,28	.32	.59	2.06	5,28	.30	.51	1.28	5,26	.33	.42	.50	5,28
2. Debilitating Anxiety	-.22	.40	.94	4,29	-.14	.40	1.17	4,29	-.20	.31	.46	4,29	-.22	.30	.30	4,29
3. Achievement Anxiety	.22	.26	.16	4,29	.25	.45	1.30	4,29	.31	.51	1.58	4,29	.32	.37	.33	4,29
4. State Anxiety	-.12	.28	.48	4,29	.14	.50	2,25	4,29	.26	.33	.32	4,29	.14	.37	1.02	4,29
5. Trait Anxiety	-.19	.31	.46	4,29	-.12	.47	1.90	4,29	.05	.28	.58	4,29	-.10	.37	1.10	4,29
6. Worry	-.18	.49	1.22	6,27	-.06	.54	1.87	6,27	-.40	.58	1.19	6,21	-.26	.59	1.91	6,27
7. Emotionality	-.13	.55	4.18*	3,30	-.07	.40	1.81	3,30	.01	.62	6.39**	3,30	-.07	.58	5.06*	3,30
8. Pre-Drawing Anxiety	-.19	.70	2.37*	9,24	-.06	.68	2.23	9,24	-.27	.70	2.19	9,24	-.20	.76	3.45**	9,24
9. Drawing Self-Evaluation	.30	.46	.84	5,28	.33	.49	.98	5,28	.65	.74	1.55	5,28	.53	.65	1.47	5,28
10. Drawing Task Evaluation	.25	.43	.88	5,28	.21	.42	.92	5,28	.53	.68	1.78	5,28	.40	.58	1.49	5,28
11. Total Drawing Evaluation	.20	.45	.58	7,26	.28	.47	.69	7,26	.61	.74	1.36	7,26	.48	.63	1.04	7,26
12. Drawing Interest Before	.23	.60	2.65*	5,28	.14	.45	1.21	5,28	.32	.50	1.13	5,28	.28	.54	1.66	5,28
13. Drawing Interest During	.30	.54	1.08	4,29	.23	.39	.81	4,29	.52	.60	1.03	4,29	.43	.56	1.31	4,29
14. Drawing Interest After	.28	.37	.38	5,28	.30	.53	1.47	5,28	.49	.69	2.64*	5,28	.44	.60	1.45	5,28
15. Total Drawing Interest	.32	.47	.30	11,34	.24	.65	1.27	11,34	.53	.74	1.24	11,34	.44	.62	.65	11,34
16. Formal Drawing Instruction	.19	.29	.54	3,30	-.07	.25	.62	3,30	.20	.46	2.26	3,30	.11	.85	.65	3,30
17. House Time	.24	.28	.13	4,29	-	-	-	-	-	-	-	-	-.02	.22	.36	4,29
18. Tree Time	-	-	-	-	.29	.29	.04	1,32	-	-	-	-	.23	.24	.29	1,32
19. Person Time	-	-	-	-	-	-	-	-	.08	.42	3.32	2,31	-.03	.36	2.34	2,31
20. Age	-.37	.60	2.56	4,29	-.27	.42	.95	4,29	.04	.29	.66	4,29	-.23	.48	1.63	4,29
21. IQ ( $n= 35$ )	.06	.34	.89	4,29	.11	.53	2.73*	4,29	.21	.43	1.27	4,29	.15	.51	2.33	4,29

\* $p < .05$ \*\* $p < .01$

Table 34

Summary Table of Kurtosis and Skewness of the  
 Criterion Variables for the Total ( $n = 367$ ), Male  
 ( $n = 142$ ), and Female ( $n = 225$ ) Samples

Drawing Scores	Total		Males		Females	
	Kurtosis	Skewness	Kurtosis	Skewness	Kurtosis	Skewness
Degree of House Shading	10.48	2.29	5.01	1.79	13.69	2.60
Degree of Tree Shading	.82	.89	1.02	1.00	.58	.75
Degree of Person Shading	14.69	2.82	28.00	4.43	1.85	1.41
Degree of H-T-P Shading	2.05	1.09	3.42	1.46	1.17	.84
Quality of House Shading	- .48	- .00	- .89	.10	.00	.18
Quality of Tree Shading	- .63	- .04	- .63	- .03	- .68	- .03
Quality of Person Shading	- .23	.17	- .29	.50	.55	- .06
Quality of H-T-P Shading	- .39	- .05	- .61	.01	- .22	.03

Table 35

Summary Table of Kurtosis and Skewness of the Predictor Variables for the Total ( $n=367$ ), Male ( $n=142$ ), and Female ( $n=225$ ) Samples

Predictor Variables	Total		Males		Females	
	Kurtosis	Skewness	Kurtosis	Skewness	Kurtosis	Skewness
1. Facilitating Anxiety	.22	-.02	.41	-.24	.10	.13
2. Debilitating Anxiety	-.21	.09	.09	.30	-.47	-.06
3. Achievement Anxiety	.08	-.12	.70	-.30	-.41	.00
4. State Anxiety	1.16	.99	.18	.69	1.34	1.08
5. Trait Anxiety	-.14	.38	.11	.49	-.25	.29
6. Worry	2.91	1.54	3.43	1.66	2.53	1.45
7. Emotionality	5.97	2.37	6.57	2.57	4.67	2.11
8. Pre-Drawing Anxiety	3.33	1.71	4.46	1.98	1.93	1.44
9. Drawing Self Evaluation	-.23	.03	-.79	.08	.24	.00
10. Drawing Task Evaluation	.08	-.27	-.32	-.28	.40	-.27
11. Total Drawing Evaluation	-.04	-.10	-.50	-.08	.34	-.12
12. Drawing Interest Before	-.56	.05	-.53	-.05	-.64	.10
13. Drawing Interest During	-.30	-.61	-.29	-.58	-.34	-.62
14. Drawing Interest After	-.95	-.12	-1.04	-.06	-.88	-.16
15. Total Drawing Interest	-.44	-.27	-.41	-.30	-.52	-.24
16. Formal Drawing Instruction	1.82	1.36	2.55	1.59	1.50	1.24
17. House Time	.24	.16	.28	.14	.20	.18
18. Tree Time	1.38	.85	.67	.78	1.82	.89
19. Person Time	.42	.22	.16	.41	.53	.13
20. Age	4.80	1.87	1.39	1.21	6.86	2.60
21. IQ	.59	-.44	.36	-.37	-.22	-.47

skewness, and since there was no theoretical and/or empirical rationale to the contrary, the obtained variable distributions were retained, i.e., not normalized.

Although for some of the experimental hypotheses the eta coefficient gives a better indication of "true" relationship in the sample, the linear model was followed in all subsequent multivariate analyses with the above cautions in mind. The acceptance of this model no doubt introduced some variability into the results and lowered some of the multiple correlations; however, this procedure was on the conservative side and is felt to adequately represent the data.

#### Stepwise Multiple Regression Analysis of the Predictor Variables

Stepwise multiple regression analysis was performed to determine the order of the best predictors from among the 12 separate and composite predictor variables for the Degree and Quality of Shading on the House, Tree, Person, and combined H-T-P drawings. Table 36 presents the order of the 12 best predictors and the multiple correlation coefficients ( $R$ 's) associated with the indicated number of predictors which remained in the equation.

Degree Criteria. For Degree of House Shading eight predictors produced a maximum multiple  $R$  of .37 ( $p < .01$ ). It can also be seen in Table 36 that time spent on the House drawing was the first best predictor, followed by total drawing evaluation, state anxiety, total drawing interest, achievement

Table 36

Best Predictors of Degree of Shading with Separate<sup>a</sup> and Composite<sup>b</sup>  
Variables as Input of a Stepwise Multiple Regression ( $n = 367$ )

Drawing	Best Predictors											
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th
	<u>r</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>
House	HT .29	TDE .33	SA .35	FDI .36	TDI .36	AA .37	PDA .37	SEX .37**				
Tree	TDE .21	AGE .26	FDI .28	TT .29	SA .30	TA .31	TDI .32	AA .32**				
Person	TDI .22	PT .26	TDE .28	FDI .29	TA .30	SA .30	SEX .30	AA .30**				
H-T-P	TDE .28	HT .33	FDI .35	TDI .37	AGE .38	SA .39	TA .40	AA .40	PT .40	SEX .40	TT .40	PDA .40**

<sup>a</sup> SA - State Anxiety  
 TA - Trait Anxiety  
 FDI - Formal Drawing Instruction  
 HT - House Time  
 TT - Tree Time  
 PT - Person Time  
 AGE - Age  
 SEX - Sex

<sup>b</sup> AA - Achievement Anxiety  
 PDA - Pre-Drawing Anxiety  
 TDE - Total Drawing Evaluation  
 TDI - Total Drawing Interest

\*\*  $p < .01$

anxiety, pre-drawing anxiety, and sex. However, after the sixth predictor, achievement anxiety, little was added by the remaining variables. Since a multiple  $R$  can be interpreted as a Pearson  $r$  (McNemar, 1966), the significance of the multiple  $R$ 's was determined by reference to Guilford's (1965) table of significant correlations coefficients for the appropriate number of predictor variables.

For the remaining drawings on the Degree of Shading criteria, Tree shading was predicted with a multiple  $R$  of .32 ( $p < .01$ ), Person shading with a multiple  $R$  of .30 ( $p < .01$ ), and Total H-T-P shading with a multiple  $R$  of .40 ( $p < .01$ ). As can be observed in Table 36 the most common variables among the top five predictors are time spent on drawing, drawing self-evaluation, drawing interest, and formal drawing instruction.

Since IQ was only available on a subsample of 137 subjects, separate stepwise multiple regression equations were computed which included IQ as an additional predictor variable. Table 37 shows that on this subsample ( $n = 137$ ), multiple  $r$ 's are raised and that the order of the predictors alters somewhat. However, it should be noted that IQ, which was among the top six predictors for all four drawings, is apparently also contributing to the predictability of Degree of Shading.

Quality Criteria. To determine the predictability of the Quality of Shading criterion, stepwise multiple correlations were computed for all three drawings on the subsample of 70 subjects whose drawings were rated for this category of shading. Table 38 presents the results for the three drawings and combined H-T-P. As can be observed prediction of Quality of Shading is higher than

Table 37

Best Predictors of Degree of Shading with Separate<sup>a</sup> and Composite<sup>b</sup>  
Variables (Including IQ) as Input of a Stepwise  
Multiple Regression ( $n = 137$ )

Drawing	Best Predictors												
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th
	<u>r</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>
House	HT .21	FDI .28	TA .31	IQ .36	SA .38	SEX .38	AA .40	AGE .40	PDA .40	TDI .41	TDE .41**		
Tree	AGE .23	TT .32	AA .34	IQ .37	TDE .38	SA .39	TA .40	PDA .40	SEX .41	FDI .41**			
Person	FDI .21	PT .29	TA .36	SA .40	TDI .42	IQ .43	AGE .43	SEX .43	AA .43	PDA .44	TDE .44**		
H-T-P	HT .23	AGE .32	TA .37	SA .43	FDI .46	IQ .49	AA .50	PT .51	SEX .52	TT .53	TDE .54	PDA .54	PDA .54**

<sup>a</sup> SA - State Anxiety  
 TA - Trait Anxiety  
 FDI - Formal Drawing Instruction  
 HT - House Tree  
 TT - Tree Time  
 PT - Person Time  
 AGE - Age  
 SEX - Sex  
 IQ - IQ

<sup>b</sup> AA - Achievement Anxiety  
 PDA - Pre-Drawing Anxiety  
 TDE - Total Drawing Evaluation  
 TDI - Total Drawing Interest

\*\*  $p < .01$

Table 38

Best Predictors of Quality of Shading with Separate<sup>a</sup> and Composite<sup>b</sup>  
Variables as Input of a Stepwise Multiple Regression ( $n = 70$ )

Drawing	Best Predictors												
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th
	<u>r</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>
House	TDE .38	SA .50	AA .53	HT .56	SEX .58	AGE .59	FDI .60	PDA .60	IQ .60	TA .60**			
Tree	TT .41	AA .53	TDE .55	TA .56	SA .57	TDI .57	AGE .58	SEX .58	PDA .58	IQ .58	FDI .58**		
Person	TDE .44	IQ .52	SEX .56	TDI .60	AA .63	PT .63	FDI .63	AGE .64	TA .64	PDA .65	SA .65**		
H-T-P	TDE .43	AA .56	TT .59	SEX .61	IQ .63	TDI .64	HT .64	FDI .65	SA .65	TA .66	PDA .66	AGE .66	PDA .66**

<sup>a</sup> SA - State Anxiety  
 TA - Trait Anxiety  
 FDI - Formal Drawing Instruction  
 HT - House Tree  
 TT - Tree Time  
 PT - Person Time  
 AGE - Age  
 SEX - Sex  
 IQ - Otis IQ

<sup>b</sup> AA - Achievement Anxiety  
 PDA - Pre-Drawing Anxiety  
 TDE - Total Drawing Evaluation  
 TDI - Total Drawing Interest

\*\*  $p < .01$

that of Degree of Shading, and it can be seen that the order of the predictors were changed. Total drawing self-evaluation, drawing time, and total drawing interest remained among the six top predictors, but achievement anxiety and sex also seemed to be contributing to the prediction of this category of shading. Surprisingly, IQ was among the top six predictors for only the Person drawing and the total H-T-P.

Double Cross-Validation Procedure. Since, according to Guilford (1954), multiple regression yields an inflated predictive value of tests due to the capitalization on chance, "shrinkage" should be determined by cross-validation on a new sample. However, as Moiser (1951) indicated, the best method of obtaining an unbiased measurement of predictive effectiveness is the double cross-validation procedure. Therefore, in order to determine the validity of the obtained regression weights for the combined H-T-P, a double cross-validation was performed by splitting the Total sample ( $n = 367$ ) into two equal random subsamples (Samples A and B;  $n = 183$ , respectively). Following this procedure, two separate stepwise multiple correlations were computed on Sample A and Sample B. The results of these analyses produced identical multiple  $R$ 's of .42, but a different order of predictors (see Table 39). Table 40 reports the test of difference between these two multiple  $R$ 's which is obviously .00. Table 41 presents the multiple  $R$ 's which resulted when the B weights (raw score regression weights) from Samples A and B were used as the "best" weights on the opposite sample while retaining the respective sample constants. As can be seen, shrinkage or "drop" occurred in both cross-validated samples. However, as is shown

Table 39

Best Predictors of Degree of Shading with Separate<sup>a</sup> and Composite<sup>b</sup>  
 Variables as Input of a Stepwise Multiple Regression  
 of Total H-T-P for Sample A and B ( $n = 183$ )

Drawing	Best Predictors											
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th
	<u>r</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>
H-T-P Sample A	HT .28	FDI .35	AGE .37	TDI .40	AA .41	SEX .41	TDE .42	SA .42	TA .42	TT .42	PDA .42	PT .42**
H-T-P Sample B	TDE .32	TDI .36	SA .40	HT .40	TA .41	FDI .42	AGE .42	PT .42	PDA .42	TT .42	AA .42	SEX .42**

<sup>a</sup> SA - State Anxiety  
 TA - Trait Anxiety  
 FDI - Formal Drawing Instruction  
 HT - House Time  
 TT - Tree Time  
 PT - Person Time  
 AGE - Age  
 SEX - Sex

<sup>b</sup> AA - Achievement Anxiety  
 PDA - Pre-Drawing Anxiety  
 TDE - Total Drawing Evaluation  
 TDI - Total Drawing Interest

\*\*  $p < .01$

Table 40

Multiple R's, Fisher Z Scores, Levels of Significance,  
and a Test of Difference (t test) Between  
Samples A and B for Degree H-T-P

Group	<u>n</u>	<u>R</u>	<u>Z</u>	<u>t</u>	<u>p</u>
Sample A	183	.42**	.448		
Sample B	183	.42**	.448	.00	NS

\*\* p < .01

Table 41

Multiple R's, Fisher Z Scores, Levels of Significance,  
and a Test of Difference (t test) Between  
Cross-Validation Samples A and B

Group	<u>n</u>	<u>R</u>	<u>Z</u>	<u>t</u>	<u>p</u>
Cross-Validation B to A	183	.22	.224		
Cross-Validation A to B	183	.25	.255	-.03	NS

in Table 42--which presents the tests of difference ( $t$  tests) between Samples A and B and their respective cross-validated samples--cross-validation Sample A to B was not significantly different from Sample B ( $p > .05$ ) indicating successful cross-validation. Cross-validation Sample B to A was not significantly different from cross-validation Sample A to B (see Table 41), but it was significantly different from Sample A at the  $p < .05$  level. Nevertheless, both cross-validation samples were not significantly different from zero. This would give one less confidence in the cross-validation weights than desired.

Summarized in Table 43 are the multiple correlation coefficients for the Total sample, Samples A and B, and the cross-validated Samples A and B. Also, shown are the results of the tests of difference ( $t$  tests) between a total sample multiple  $R$  and a subsample multiple  $R$  based on the formula suggested by Dayhaw in a personal communication to McInnis (1972).

This formula is as follows:

$$R_s = \frac{1 - R_t^2}{\sqrt{N_s - 1}} \sqrt{\frac{N_t - N_s}{N_t - 1}}$$

where  $R_t$  = multiple R for the total group  
 $N_t$  = number in the total group  
 $N_s$  = number in the subgroup

yields the standard error of the difference between a multiple  $R$  of a subgroup and the multiple  $R$  of the total group containing the subgroup (Carver, 1974; McInnis, 1972).

Table 42

Levels of Significance and Tests of Difference (t tests)  
 Between the Multiple R's for Samples A and B with  
 the Cross-Validation Multiple R's for Samples  
 A and B for Degree H-T-P Shading

Group	<u>n</u>	<u>R</u>	Cross- Validation	<u>R</u>	<u>t</u>	<u>p</u>
Sample A	183	.42**	B to A	.22	2.12	$p < .05$
Sample B	183	.42**	A to B	.25	1.82	NS

\*\*  $p < .01$

Table 43

Summary of Multiple  $\underline{R}$ 's, Fisher  $\underline{Z}$  Scores, Levels of Significance,  
and Tests of Difference ( $\underline{t}$  tests) Between Subgroup  
Multiple  $\underline{R}$ 's and Total Group Multiple  $\underline{R}$ 's  
for Degree H-T-P Shading

Group	$\underline{n}$	$\underline{R}$	$\underline{Z}$	$\underline{t}$	$\underline{p}$
Total Sample	367	.40**	.424	-	-
Sample A	183	.42**	.448	.54	NS
Sample B	183	.42**	.448	.54	NS
Cross-Validation B to A	183	.22	.224	-4.53	$\underline{p} < .001$
Cross-Validation A to B	183	.25	.255	-3.81	$\underline{p} < .001$

\*\*  $\underline{p} < .01$

### Sex as a Moderator of Degree of H-T-P Shading

In order to determine if sex were operating as a moderator variable, i.e., contributing to higher predictability when used to subgroup (Zedeck, 1971), separate stepwise multiple regression analyses were computed for the Male ( $n = 142$ ) and Female ( $n = 225$ ) samples. Results of the order of best predictors and associated multiple  $R$ 's are shown for Males and Females in Tables 44 and 45, respectively.

Multiple Regression Analyses. Results of these separate analyses show higher multiple  $R$ 's for the Male sample on the Tree, Person, and combined H-T-P; yet none of these multiple  $R$ 's were significantly different from those obtained by the Female sample. The obtained multiple  $R$ 's were generally higher than those for the Total ( $n = 367$ ) sample, yet they were not significantly different from each other (see Table 46). Since Zedeck (1971) implied that the best way of demonstrating a moderator effect was to compare the multiple  $R$  of a subgroup to the multiple  $R$  of the total group, Table 47 shows the results of these tests with Dayhaw's (McInnis, 1972) formula. As can be observed none of the subgroup multiple  $R$ 's were significantly higher than that of the Total sample.

These results seem to indicate that sex was not acting as a moderator of Degree of Shading for the combined H-T-P, yet the ordering of the best predictors was systematically different for several of the variables. With males, formal drawing instruction, in general, seemed to be the best predictor of Degree of Shading, but with females, formal drawing instruction was generally least predictive. Conversely, with females, total drawing

Table 44

Best Predictors of Degree of Shading for Males with Separate<sup>a</sup> and Composite<sup>b</sup>  
Variables as Input of a Stepwise Multiple Regression ( $n = 142$ )

Drawing	Best Predictors										
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th
	<u>r</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>
House	FDI .23	HT .29	SA .33	TA .35	AGE .36	AA .36	PDA .36	TDI .36	TDE .36*		
Tree	FDI .30	AGE .35	SA .40	TT .42	TA .43	PDA .44	TDE .45	TDI .45	AA .45**		
Person	PT .26	TDI .31	TA .33	AGE .35	FDI .36	TDE .36	SA .36	AA .36	PDA .36*		
H-T-P	FDI .31	SA .35	TA .39	HT .41	PT .42	AGE .43	TT .44	PDA .45	TDE .45	AA .45	TDI .45

<sup>a</sup> SA - State Anxiety  
 TA - Trait Anxiety  
 FDI - Formal Drawing Instruction  
 HT - House Time  
 TT - Tree Time  
 PT - Person Time  
 AGE - Age  
 SEX - Sex

<sup>b</sup> AA - Achievement Anxiety  
 PDA - Pre-Drawing Anxiety  
 TDE - Total Drawing Evaluation  
 TDI - Total Drawing Interest

\*  $p < .05$   
 \*\*  $p < .01$

Table 45

Best Predictors of Degree of Shading for Females with Separate<sup>a</sup> and Composite<sup>b</sup>  
Variables as Input of a Stepwise Multiple Regression ( $n = 225$ )

Drawing	Best Predictors									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
	<u>r</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>	<u>R</u>
House	HT .34	TDE .40	TDI .42	SA .43	PDA .43	AGE .43	TA .43	AA .44	FDI .44**	
Tree	TDE .24	AGE .27	TDI .30	PDA .32	TT .33	AA .34	SA .34	TA .34	FDI .34**	
Person	TDI .21	TDE .25	PT .26	AGE .28	FDI .29	SA .29	TA .29	PDA .29		
H-T-P	TDI .33	HT .38	TDE .42	AGE .43	PDA .43	SA .44	AA .44	FDI .44	PT .44	TT .44**

<sup>a</sup> SA - State Anxiety  
 TA - Trait Anxiety  
 FDI - Formal Drawing Instruction  
 HT - House Time  
 TT - Tree Time  
 PT - Person Time  
 AGE - Age  
 SEX - Sex

<sup>b</sup> AA - Achievement Anxiety  
 PDA - Pre-Drawing Anxiety  
 TDE - Total Drawing Evaluation  
 TDI - Total Drawing Interest

\*\*  $p < .01$

Table 46

Multiple R's, Fisher Z's, Levels of Significance,  
and a Test of Difference (t test) Between  
the Male (n = 142) and Female (n = 225)  
Samples for Degree H-T-P Shading Scores

Group	<u>n</u>	<u>R</u>	<u>Z</u>	<u>t</u>	<u>p</u>
Male Sample	142	.45**	.485		
Female Sample	225	.44**	.472	.12	NS

\*\* p < .01

Table 47

Multiple R's, Fisher Z's, Levels of Significance,  
and Tests of Difference (t tests) between  
the Subsample and the Total Sample for  
for Degree H-T-P Shading Scores

Group	<u>n</u>	<u>R</u>	<u>Z</u>	<u>t</u>	<u>p</u>
Total Sample	367	.40**	.424	-	-
Sample A	183	.42**	.448	.54	NS
Sample B	183	.42**	.448	.54	NS
Males	142	.45**	.478	1.10	NS
Females	225	.44**	.472	1.39	NS

\*\* p < .01

interest and total drawing evaluation were among the top predictors. These relationships seem to indicate a difference in the way formal drawing instruction, drawing interest, and drawing evaluation interrelate for males and females.

Double Cross-Validation Procedure. In order to determine if the multiple regression weights would hold up within sex better than in the Total group, double cross-validation procedures were performed within the Male ( $n = 142$ ) and Female ( $n = 225$ ) samples. Each sample was randomly divided into two equal subgroups ( $n = 71$  and  $112$ , for the Male and Female subgroups, respectively). Then, separate multiple regression analyses were computed within each sex-subgroup and the regression weights applied to the opposite sex-subgroup.

Table 48 presents the multiple  $R$ 's for the sex-subgroups and tests of difference ( $t$  tests) between the respective samples. As can be observed, differences between respective subgroups are not significant.

Presented in Table 49 are the tests of difference ( $t$  tests) between the respective cross-validated multiple  $R$ 's. These respective multiple  $R$ 's are likewise not significantly different.

Table 50, presenting the tests of difference ( $t$  tests) between the sex-subgroups and the respective cross-validated subgroups, shows that three out of the four subgroups successfully cross-validated. It, therefore, appears that the regression weights for the Female subgroups, held up better than those obtained in the Male subgroups--i.e., both multiple  $R$ 's for the

Table 48

Multiple R's, Fisher Z's, Levels of Significance,  
and Tests of Difference (t tests) between  
Sex-Subgroups for Degree H-T-P Shading

Group	<u>n</u>	<u>R</u>	<u>Z</u>	<u>t</u>	<u>p</u>
Male Sample					
Subgroup A	71	.64**	.765		
Subgroup B	71	.44	.472	1.68	NS
Female Sample					
Subgroup A	112	.54**	.604		
Subgroup B	112	.45*	.485	.91	NS

\* p < .05

\*\* p < .01

Table 49  
 Multiple  $R$ 's, Fisher  $Z$ 's, Levels of Significance,  
 and Tests of Difference ( $t$  tests) Between  
 Respective Cross-Validation Subgroups  
 for Degree H-T-P Shading

Group	$n$	$R$	$Z$	$t$	$p$
Male Sample					
Subgroup A Cross-Validation B to A	71	.20	.203		
Subgroup B Cross-Validation A to B	71	.16	.161	.24	NS
Female Sample					
Subgroup A Cross-Validation B to A	112	.34	.354		
Subgroup B Cross-Validation A to B	112	.26	.455	.65	NS

Table 50

Levels of Significance and Tests of Difference (t tests)  
 Between Multiple R's for the Sex-Subgroups and  
 Multiple R's for Respective Cross-Validated  
 Subgroups on Degree H-T-P Shading

Group	<u>n</u>	<u>R</u>	Cross- Validation	<u>R</u>	<u>t</u>	<u>p</u>
Male Sample						
Subgroup A	71	.64**	B to A	.20	3.21	<u>p</u> < .01
Subgroup B	71	.44	A to B	.16	1.80	NS
Female Sample						
Subgroup A	112	.54**	B to A	.34	1.89	NS
Subgroup B	112	.45*	A to B	.26	1.56	NS

\* p < .05

\*\* p < .01

Male subgroups were lower, and only one held up on cross-validation. Nevertheless, caution should be exercised in the interpretation of these results since none of the cross-validated  $R$ 's were significantly different from zero ( $p > .05$ ) for the given number of predictors and the size of the subgroups. Zedeck (1971) however, cites the reduction in size of the samples as a problem in subgrouping analyses--i.e., usually contributing to lack of significance.

Summarized in Table 51 are the multiple  $R$ 's of the Total, Male, and Female samples as well as those of the sex-subgroups and cross-validation groups. Also presented are the tests of differences ( $t$  tests) between the subsamples and their respective "total" sample based on Dayhaw's formula yielding the standard error of the difference between the multiple  $R$  of a subgroup and the multiple  $R$  of the total group containing the subgroup (Carver, 1974; McInnis, 1972).

As can be observed, there are no significant differences between the multiple  $R$ 's of the Male or Female samples and the multiple  $R$ 's of the Total sample. This seems to confirm that sex does not appear to be a moderator of Degree H-T-P shading. Within each of the Male and Female samples, one of the sex-subgroups were significantly better than their respective "total" samples--undoubtedly by chance. However, all cross-validated sex-subgroup multiple  $R$ 's were significantly less ( $p > .05$ ) than their respective "total" samples.

Although the above results show statistically--at least according to Zedeck's (1971) criteria--that sex does not appear to be a moderator of

Table 51

Summary of Multiple R's, Levels of Significance, and Tests of Difference ( $t$  tests) Between Sex-Subgroup Multiple R's and Respective "Total" Multiple R's for Degree H-T-P Shading

Group	<u>n</u>	<u>R</u>	<u>Z</u>	<u>t</u>	<u>p</u>
Total Sample	367	.40**	.424	-	-
Male Sample	142	.45**	.485	1.10	NS
Subgroup A	71	.64**	.765	4.04	$p < .001$
Cross-Validation B to A	71	.20	.203	-4.17	$p < .001$
Subgroup B	71	.44	.472	-.18	NS
Cross-Validation A to B	71	.16	.161	-4.78	$p < .001$
Female Sample	225	.44**	.472	1.39	NS
Subgroup A	112	.54**	.604	2.43	$p < .05$
Cross-Validation B to A	112	.34	.354	-2.17	$p < .05$
Subgroup B	112	.45*	.485	.23	NS
Cross-Validation A to B	112	.26	.455	-3.79	$p < .001$

\*  $p < .05$   
 \*\*  $p < .01$   
 \*\*\*  $p < .001$

Degree H-T-P shading, the fact that the multiple  $R$ 's of the Male and Female samples cross-validated differently, suggests that sex should be taken into consideration in further research with the shading variable.

#### Factor Analysis of the Quality of Shading Scales

Since quantifying the Quality of Shading had only been superficially attempted previously (Shershen, 1971), the analyses with this category of shading are only considered as an exploratory part of this research. Table 52 displays the intercorrelation coefficients among the 10 Quality Scales and also indicates their means and standard deviations. As can be observed, Quality of Shading Scales 1, 2, 3, 4, and 7, correlated rather highly with a scale indicating overall "poorness" or "goodness" of Quality of Shading (QSS 10). Separate male-female intercorrelations were not computed due to the small sample of each sex ( $n = 35$ )

To determine the factors existing within the Quality of Shading Scales, a classical factor analysis with iteration and rotation to a varimax orthogonal solution, was performed. The results of the factor analysis presented in Table 53 show that there are three factors accounting for the common variance in the Quality of Shading Scales. Factor I, accounting for 72.7% of the variance, seems to be an Overall Quality of Shading factor. Factor II, which accounts for 16.8% of the variance, appears to be a Neatness factor. Factor III, accounting for the remaining 10.5% of the variance, seems to clearly represent a Lightness-Darkness factor.

These results, although interesting, should only be considered suggestive due to the small size of the sample ( $n = 70$ ).

Table 52

Intercorrelation Coefficients (Pearson  $r$ 's) among  
all Quality of Shading Scales and their Means  
and Standard Deviations ( $n = 70$ )

Quality of Shading Scales	1	2	3	4	5	6	7	8	9	10
1	-									
2	.74	-								
3	.67	.62	-							
4	.59	.83	.45	-						
5	-.38	-.57	-.28	-.51	-					
6	-.04	-.06	-.03	.09	.36	-				
7	.75	.73	.74	.62	-.37	.06	-			
8	.04	-.19	.09	-.16	.33	.18	.12	-		
9	.39	.56	.36	.50	-.28	.11	.42	-.24	-	
10	.80	.91	.75	.79	-.50	.01	.82	-.06	.48	-
Mean	41.9	35.2	38.7	40.3	38.2	26.9	44.1	27.5	34.1	35.7
SD	5.6	10.5	6.4	8.8	8.2	4.1	6.5	2.6	7.1	9.1

Table 53

Varimax Rotated Factor Matrix of the Quality  
of Shading Scales with Eigenvalues and  
Percentage of Variance Accounted

Quality of Shading Scales	Factor I	Factor II	Factor III
1. Enhancing - Detracting	.842	.050	-.063
2. Ordinary - Artistic	.841	.476	-.008
3. Random strokes - Controlled strokes	.786	-.080	-.067
4. Two-dimensional - Three- dimensional	.693	.480	.148
5. Reinforced - Unreinforced	-.399	-.524	.351
6. Very light - Very heavy	.028	-.123	.876
7. Appropriately used - Inappro- priately used	.901	-.025	.030
8. Over meticulous - Sloppy	.097	-.604	.122
9. Uniform-in-type - Varied-in- type	.443	.388	.166
10. Poor quality - Good quality	.944	.244	.010
Eigenvalue	5.02	1.16	.72
Percentage of Common Variance	72.7	16.8	10.5
Cumulative Percentage	72.7	89.5	100.0

## Chapter IV

### DISCUSSION

This chapter discusses the implications of the results of this study in light of previous research on shading in projective drawings and the proposed theoretical rationale. Suggestions for further research are also given.

#### A General Overview

Since the primary concern of this research was the thorough investigation of the propounded relationship between shading in the H-T-P and anxiety, this study attempted to solve the inherent problems involved in both variables by a comprehensive approach, yet with specificity of scope. It was conjectured that the inconclusiveness in all previous research on shading in projective drawings resulted from the use of diverse, shading scoring methods and weaknesses in basic theoretical assumptions of shading and anxiety. In former studies, both shading and anxiety have been treated as unitary constructs when, in fact, complex constructs exist (Alpert & Haber, 1960; Buck, 1948, 1966; Cattell, 1966; Kinget, 1952; Libert & Morris, 1967; Machover, 1951; Spielberger, 1966, 1972a, 1972b).

This research attempted to clarify the proposed relationship between shading in the H-T-P and anxiety by employing three separate shading categories, and by attempting to measure the major dimensions of anxiety--

i.e., general and situationally specific. This latter dimension of anxiety was further measured as trait-test anxiety and state-test anxiety. The measurement of the two basic components of state-test anxiety--i.e., cognitive concern (worry) and autonomic arousal (emotionality) -- was also attempted.

Since other factors such as motivation, drawing time, drawing evaluation (i.e., felt competency), and formal drawing instruction were also thought to be related to shading in projective drawings, these variables were likewise measured and employed in subsequent multivariate analyses. As well, IQ and sex are other variables which were included in this study due to inconsistencies reported in the literature.

Shading was rated as to its presence or absence (Incidence), its amount and intensity (Degree), and its "goodness" or "poorness" stimulus value in the drawing (Quality). Hypotheses were formulated concerning these categories of shading and the appropriate statistical tests carried out.

#### Measurement Reliabilities of the Data

However before the hypotheses could be tested, it was felt necessary to establish the reliability with which shading could be rated in each category. As was shown in the results (see Table 2), shading could be highly agreed upon as being present or absent, and furthermore, Degree of Shading produced high consistency among three raters (average Ebel interrater reliability ratings over .90). These results are consistent

with previous research (Bieliauskas & Clarke, 1965; Shershen, 1971; Berger, Note 1), and lend support to the supposition by a few die hard researchers that shading is an observable, and therefore, researchable variable. Likewise, the measurement of the Quality of Shading--which was solely an exploratory attempt to get at an aspect of shading which had been alluded to by Buck (1948) and Kinget (1952) and has likely influenced the judgments and interpretations of practicing clinicians--yet heretofore, has not been fully empirically studied. Nevertheless, it seems that Quality of Shading could also be reliably rated (average Ebel interrater reliabilities of .74 and greater)--although not quite as highly as the Degree of Shading. Therefore, with the reliability of the shading categories established, it was felt that temporal stability of shading should also be determined.

Test-retest reliability, over a 4- to 6-week period, was adequate for the Incidence category (greater than 70% consistency), but for the Degree of Shading, was less than desirable ( $r(44) = .35$  to  $.53$ ) for an indicator of a trait characteristic (i.e., trait anxiety, etc.). However, if shading were an indicator of state characteristics (i.e., interest, mood, etc.), then one would not expect high stability of shading over time. The emergence of large--and near significant--sex differences in the stability of Degree of Shading on the Person drawing, may be due to chance, but may also be attributed to a different stimulus pull of the Person drawing for males and females. At any rate, Degree of Shading stabi-

lity, which has not been reported previously, should be determined in future research with the allowance for the possibility that shading may be a state characteristic in a drawing and that, furthermore, sex differences may occur.

It was felt that establishing the reliability of the predictor measures was also vital to understanding the results of this study. Allowing for the small number of some of the measures--due to some subjects having to leave before completing the last two instruments--the state-trait variable model seems to explain the obtained test-retest reliabilities as being consistent with logical expectations--i.e., measures which are considered trait scales were generally above reliabilities of .70; and those considered state measures ranged from .30 to .54. Drawing evaluation measures, derived scales, were reliable for the Total sample, but significantly more reliable for the females. A likely explanation for this finding could be that the females, at least in the retest sample, may have had a more stable drawing evaluation. This could possibly be due to more past experience with drawing or to their higher general interest in the drawing tasks (see Table 19). However, both higher reliability of drawing evaluation and of drawing interest may be indicating that drawing is an activity which is more "culturally" acceptable for females and was probably practiced more by them--therefore, giving them a more stable competency rating.

Because the criterion variable, shading, was analyzed for the three drawings separately and combined (i.e., House, Tree, Person, and H-T-P) and the number of individual predictor variables was large (22), it was felt that descriptive statistics of both sets of variables would give the necessary perspective to the reader.

### The Sample Statistics and Other Research

The first statistics of interest were the high percentages of Incidence of Shading in both the Male and Female samples. Not only was Incidence of Shading in each individual drawing high (greater than 90% with shading present), but all combined H-T-P drawings of all subjects had some shading present (i.e., 100%). These high Incidence of Shading findings are in agreement with Johnson (1971), but seem to be somewhat higher than the Incidence of Shading found by Marzolf and Kirchner (1970). Since a definition of shading more conservative than Marzolf and Kirchner's (1970)--i.e., "penciling other than that of outline" (p.139)--was used, this finding of a greater Incidence of Shading possibly indicates a sample of subjects more similar to those of Johnson (1971); and therefore, the findings of this study, as far as Incidence of Shading is concerned, might not directly relate to those of Marzolf and Kirchner (1970; 1971; 1972).

Since the Degree of Shading scores were obtained by a modification of the grid rating method of Bieliauskas and Clarke (1965), a direct comparison of the obtained scores to their findings was not possible; however, their interrater reliabilities (Pearson  $r$  (28) = .85 to .96; two raters) and intercorrelations (House-Tree = .30; House-Person = .25; Tree-Person = .25;  $n$  = 138) among the separate drawings were comparable to those found in this study (see Tables 15, 16 and 17). Since the modification of the Bieliauskas and Clarke Degree of Shading rating method employed in this research appears more objective, is easier for some raters to use, and yields comparable results, its further development and use is encouraged.

As for Quality of Shading, the only comparison which could be made was with the previous findings of Shershen (1971). Similarly as in that study—although using a different rating of the Quality of Shading, i.e., Buck's "healthy" and "unhealthy" shading--it was found that the relationship between Degree and Quality of Shading is generally nonsignificant or negative. This finding seems to support the assumption that both categories of shading are, in fact, uniquely different. The interrelationships between Incidence and Degree and Incidence and Quality of Shading were, as expected, generally positive.

In looking at the predictor variables, it was shown that there were a number of sex differences not only between means of males and females, but also between male-female intercorrelations. Females were found significantly higher on trait anxiety, general drawing interest, and time spent on the Person drawing. Although a significant sex difference on trait anxiety (as measured by the STAI-T) was not reported by Spielberger (1970) in his manual, perusal of his standardization information tables indicates that females generally had slightly higher scores.

In general, the interrelationships among the predictor variables were usually less than .50, indicating that they were likely measuring different things. Of course, part-whole correlations were high. Finding that the number of differences between male-female intercorrelations was greater than expected by chance, solidified the supposition that the data be analyzed and reported separately by sex, as well as for the total group. With the background of the predictor and criterion variables explained, the results of the research hypotheses will be discussed in the following section.

## Discussion of the Research Hypotheses

By in large, most of the research hypotheses proposed in this study were confirmed. Except for the first three hypotheses (1-3), hypotheses 4-12 were stated in a general way so as to apply to all three categories of shading, i.e., Incidence, Degree, and Quality. However, as will be made clearer in the succeeding discussion, all three categories of shading did not relate to all the variables in the same way. As far as the number of significant relationships and the consistency for all three drawings, Incidence of Shading was most unsatisfactory. Since this category of shading was employed primarily to attempt replication of Marzolf and Kirchner's (1970) finding of a sex difference in Incidence of Shading; its hypothesis-testing function was considered of secondary importance. Because Degree of Shading can be so reliably obtained--and as a matter of consequence, contains the Incidence category--it is considered by this researcher to be the most useful category of shading and its results form the basis of this thesis. The Quality of Shading category was intended as an initial quantification of an aspect of shading relatively ignored; yet it also produced interesting and many predicted results. However, because of its exploratory nature and the small sample upon which it was measured, its variable relationships should be accepted with these considerations in mind.

Difference Hypotheses. In order to attempt to settle the question of a sex difference in Incidence, Degree, and Quality of Shading in the H-T-P,

hypotheses 1-3 were proposed and tested. In this sample, females did not show a significantly greater Incidence of Shading as had been found by Marzolf and Kirchner (1970). Females generally had more shading present in all draws, but not to a significant extent.

On the Degree of Shading category, contrary to previous research (Shershen, 1971; Berger, Note 1) males did not produce significantly higher shading scores; in fact, females were generally higher, but not significantly so. This contradictory finding possibly can be explained in this study by the relatively high positive relationship between Degree of Shading and general drawing interest in the Total sample, but for the Female sample in particular. Also, the fact that females obtained significantly higher drawing interest scores, seems to support this supposition. Although measures of drawing interest were not employed in the two studies cited above, it is suggested that interest or motivation may have been a factor in producing the male-female differences in Degree of Shading. Sample differences or test administration conditions--i.e., group or individual--may also have produced the divergent results. However, this is a problem which can only be solved in further research considering test administration conditions and level of drawing interest.

Since Quality of Shading was a "new" category of shading, there was no basis for predicting which sex would obtain higher scores. Nevertheless, it was suspected that females--based on Harris' (1963) Quality Scales of intelligence--might score higher. Females generally showed higher Quality of Shading on all three drawings, but only the Person drawing score was significant. Likewise, only further research can confirm or refute these findings.

Wine's Formulation. Hypotheses 4-7 dealt with the important consideration of Wine's (1971) directional-attentional formulation of situationally specific (test) anxiety as applied to the projective drawing test. In summary, she stated that high- and low-test anxious individuals differ in their performance on complex tasks because of differences in attentional focus. She contended that low-test anxious individuals typically perform better than high-test anxious individuals on complex tasks because of their predominant attentional focus on task relevant cues; however, the high-test anxious individual is primarily focused on self-referent, self-evaluative statements and therefore is not able to attend fully to task relevant cues. It was assumed by the researcher that drawing is a complex task which needs full attentional focus to utilize all relevant task cues. Further, it was assumed that shading is a nonessential, but relevant task cue for an adequate performance in a drawing task. Therefore, it was deduced that interferring, self-referent cues would diminish the addition of shading to the drawing.

Based upon the inconclusiveness of previous research findings of the relationship between shading and general (trait) anxiety, hypothesis 4 predicted no relationship between trait anxiety and shading. However, the relationship between trait anxiety and shading was significant in the Total sample for Incidence of Tree Shading and Quality of House Shading. Males and females produced generally similar results, i.e., negative, and showed no sex differences. This hypothesis was confirmed, i.e., non-significant, for all drawings on Degree of Shading, but overall, the results follow the relationship predicted by Wine's (1971) directional-

attentional formulation, i.e., negative. An explanation for this minimal, though consistent, negative relationship found in this study is that possibly it is a function of the trait anxiety instrument. The STAI-T (Spielberger et al., 1970) has not been reported as having been used in previous shading research in drawings, and perhaps, the STAI-T is a more sensitive instrument than other trait anxiety measures previously used in drawing research.

Hypothesis 5, following Wine's formulation, predicted that there is a negative relationship between state anxiety and shading. However, this hypothesis only held true for the Male and Total samples on Quality of Shading; for the Female sample, state anxiety was nonsignificantly related across all three categories of shading. In fact, significant sex differences were found on Quality of Shading. Surprisingly for the Male sample, state anxiety and the Degree of Shading category were positive and significantly related to all drawings except the Person. For this same category (i.e., Degree of Shading) females obtained nonsignificant correlations. It appears that level of state anxiety is positively related to Degree of Shading for males, but is possibly a debilitator of their Quality of Shading production. Therefore, Wine's attentional-directional formulation only holds for male Quality of Shading and is contradicted for their Degree of Shading. Since Spielberger et al. (1970) stated that their A-State scale may be used "as an index of drive level (D) as this concept is defined by Hull (1943) and Spence (1958)" (p. 3), it can be further said

that for males, higher drive levels appear to facilitate Degree of Shading, but interferes with their Quality of Shading. For females, drive level, at least as measured by the STAI-S, is apparently not significantly related to shading, but if anything, it seems to generally facilitate shading. Complicating these results with state anxiety and shading is the finding of several significant nonlinear relationships in all samples for both the Degree and Quality categories of shading (see Tables 28-33). Therefore, the Pearson  $r$ 's are really an underestimate, and do not show the "true" relationship of shading and state anxiety.

Based on Wine's formulation, hypothesis 6, stated that there is a significant negative relationship between shading and debilitating anxiety. This prediction resulted in general negative relationships for all samples across all categories of shading, but was particularly significant on the Quality of Shading category for males, and on the Degree of Shading category for females. These findings directly support Wine's directional-attentional formulation of the effects of situationally specific anxiety for the projective drawing test. Conversely, hypothesis 7, predicting a positive relationship between facilitating anxiety and shading, held up generally across all samples and all shading categories; but it was particularly significant for male Quality of Shading. These findings seem to indicate the usefulness of the AAT, a trait measure of situationally specific anxiety, to predict at least one aspect of shading, i.e., Quality of Shading.

The last hypothesis, dealing directly with Wine's formulation, hypothesis 8, predicted that there is a negative relationship between shading and worry. Overall, there was a general negative relationship between all categories of shading and worry for all three samples; however, significance was found only in the Total and Female samples for both Degree and Quality of Shading. Apparently, the Worry scale of the Pre-Drawing (anxiety) Questionnaire, is a better predictor of shading for a Female sample, than the STAI-S; whereas, the STAI-S is a better predictor of shading for males. A possible explanation for these findings seems to be the result of the make-up of both scales. Both the STAI-S and the Pre-Drawing Questionnaire--of which the Worry Scale is a part--are measures of situationally specific (state) anxiety. However, the Pre-Drawing Questionnaire contains statements of concern and apprehension specific to a drawing task. The STAI-S, on the other hand, indicates more general concerns, and therefore is more covert. It appears that the females in this sample were more willing to admit their concerns toward a drawing task, whereas the males were generally not. In summary, it can be concluded that the general negative relationship of all categories of shading with Worry, further supports Wine's directional-attentional formulation of situationally specific anxiety as applied to a projective drawing task.

Although no hypotheses were stated for the Emotionality scale of the Pre-Drawing Questionnaire, or the full scale, both predicted Degree of Shading for the females better than the STAI-S; similarly as for the Worry scale, it was not very predictive of male shading. This finding resulted probably for the same reasons as stated above for the Worry scale.

A Motivational Interpretation. The next series of hypotheses, 9 and 10, dealt with drawing evaluation (i.e., expectancy of success or drawing competency) for drawing in general, and on the specific tasks, respectively. A positive relationship of both scales with shading was predicted. This relationship did manifest itself strongly for Degree and Quality of Shading on the Total and Female samples, but somewhat less so for the Male sample. The total of these two scales (i.e., total drawing evaluation), also showed this same positive relationship. Since this variable, expectancy of success or competency on a drawing task was felt to be related to the amount of effort a subject is willing to expend on a drawing task, its confirmation--as reflected by the positive relationship with shading--suggests that shading is an indirect indicator of involvement in the drawing task.

Hypothesis 11, which more directly dealt with the matter of shading reflecting involvement in the drawing task, stated that there is a positive relationship between interest in a drawing task and shading. This hypothesis held up well--as reflected by the separate and combined scales--for the Total and the Female samples, particularly on Degree of Shading; but for the Male sample, it really only held up for Degree of Person Shading. Apparently, when asked to rate their interest in the drawing task, males were mainly responding to the last task, i.e., the Person; whereas, the females' interest was apparently more generalized. In order to have possibly increased predictability by the interest variable, it would have probably been better--at least for the males--to have requested their interest to each specific drawing task rather than to all three drawings in general. This is a problem for further research to consider.

Although no formal hypotheses were stated for the variable of drawing time, i.e., time spent on each individual drawing, it also lends support to the interpretation that shading is an indicator of involvement in or motivation towards a drawing task. Significant positive relationships between drawing time and certain specific drawings lead to this conclusion. Therefore, in light of the confirmation of the predicted relationships between shading and drawing evaluation, drawing interest, and drawing time, it can be stated that a motivational interpretation of shading--particularly of Degree of Shading--is a viable alternative to the traditional anxiety interpretation. However, these two interpretations are not necessarily highly divergent, particularly if anxiety is viewed as drive.

It was not the present researcher's intention to supplant the anxiety interpretation of shading with this study, but only to demonstrate to the inexperienced clinician and researcher that there is more to shading in a projective drawing than has previously met the empirical eye.

Other Predictor Variables. The final two hypotheses proposed, dealt with formal drawing training and intelligence, respectively. Hypothesis 12, stating a positive relationship between formal drawing training and shading, was confirmed for all three samples on Degree of Shading, but particularly, for the Male and Total samples. This variable, FDI, showed a relatively high positive relationship with the drawing evaluation variable and a positive, but lower relationship with drawing interest. Therefore, formal drawing instruction is not only a predictor of shading, but possibly it is an antecedent factor in drawing evaluation and drawing interest.

The last hypothesis (13), dealt with the relationship between shading and intelligence. Although previous research has not generally found a significant relationship between shading and intelligence (i.e., except for Perkinson, 1956), it was felt that a significant relationship would be shown on at least the Quality of Shading category. This finding was in fact, confirmed with a general positive relationship between Quality of Shading and intelligence (Otis IQ ). Also shown was a general negative, though nonsignificant, relationship between Degree of Shading and IQ. These results seem to indicate that the more intelligent subjects produced less Degree of Shading, but that their shading was of a higher quality. It is difficult to reconcile Perkinson's (1956) finding a positive relationship between shading and intelligence, since she likewise rated Degree of Shading. Perhaps her results were a function of the particular measure of intelligence she used or the result of sampling a different population. Possibly the employment of a nonverbal rather than verbal intelligence test, i.e., the Otis, might produce different results. The problem of the relationship between shading and intelligence still needs to be further explored.

With this section of the discussion ends the formal hypothesis testing part of this research, the remaining portion of the discussion deals with the subsequent statistical analyses which were intended solely as an attempt to describe all the data using a multivariate statistical model.

### Discussion of the Subsequent Statistical Analyses

First is discussed the testing for nonlinearity and its resulting implications. Next is discussed the prediction of both Degree and Quality of Shading, and the determination of the validity of the predicted weights with the double cross-validation procedure. Since sex was suspected of acting as a moderator variable, following these procedures further multiple regression analyses and double cross-validation procedures were performed. The implications of these subsequent findings are discussed. Finally, the analyses of the experimental Quality of Shading Scales are discussed.

Linearity of Regression. Since, according to Guilford (1954) "it behooves the investigator who employs multiple-regression procedures to assure himself that his regressions are linear" (p.404), this possibility was tested. Comparison of the obtained predictor-criterion Pearson  $r$ 's and corresponding eta coefficients show a number of comparisons to be significantly different. This, therefore indicates that some of the relationships are best described by the nonlinear coefficient. However, since eta yields a maximum correlation between two sets of variables, it was felt safer, at the present stage of shading research, to underestimate the relationships than to overestimate them. Therefore, the linear model was accepted as giving an acceptable approximation of the predictor-criterion relationships. It was realized that the acceptance of the linear model would introduce some variability into the subsequent multivariate analyses, but since these analyses were merely to further describe the sample, it was felt that these

results would be close approximations. Similar arguments were advanced for not normalizing the differently shaped distributions (Ghiselli, 1964; Nunnally, 1967). Therefore, the multivariate results should be accepted with the above consideration in mind.

Multiple Regression. The stepwise multiple regression analyses demonstrated that the prediction of shading--both Degree and Quality--could be improved by the inclusion of variables other than anxiety. Among the top "best" predictors of Degree of Shading, it was shown that drawing time, drawing self-evaluation, drawing interest, and formal drawing instruction, were common for the Total sample across all three drawings and combined H-T-P. The different anxiety scales, i.e., the different aspects of the anxiety construct, contributed to prediction alternately, and to varying extents. When IQ was added as a predictor to a subsample on which scores were available, it was also among the top six predictors across all drawings.

For the Quality of Shading scores, drawing self-evaluation, drawing time and drawing interest remained among the top five predictors, but achievement anxiety and sex also seemed to be important predictors for this category of shading.

Double Cross-Validation. From these results it can be concluded that the "new" variables introduced in this area of study, appear to be contributing to the predictability of both Degree and Quality of Shading. The least that can be said is that a multivariate approach accounts for more of the variance. But when the validity of the obtained regression weights were determined by a double cross-validation within the Total

sample, the "shrunken" cross-validated multiple  $R$ 's appeared to show that the weights were possibly capitalizing on chance. However, with the sex differences found in both predictor and criterion reliabilities--as well as in predictor-criterion variable interrelationships--it was suspected that Degree of Shading may have been moderated by sex. Therefore, multiple regression analyses were computed for each sex separately and cross-validations performed within each sex sample. The results showed higher multiple  $R$ 's for the Male sample, but these were not significantly different from the multiple  $R$ 's of the Female sample. Using Zedeck's (1971) criteria of a moderator variable, it was concluded that sex is not a moderator of Degree of Shading. Nevertheless, upon cross-validation both of the Female subgroups cross-validated--as well as one of the Male subgroups. Also, from the separate stepwise multiple regression analyses, a different pattern of predictors emerged for males and females. Formal drawing instruction was generally the best predictor of Degree of Shading for the Male sample, whereas for the Female sample, it was among the least predictive. For the females, either drawing interest or drawing evaluation were most predictive. These results seem to be indicating that for males, Degree of Shading is positively related to their experience with drawing; but for females (who have possibly had more past experience with drawing and are therefore more homogeneous) Degree of Shading is related mostly to their interest or the evaluation of their drawing competency--which is probably more realistically based.

Quality of Shading Scales. The final part of the results dealt with the "experimental" Quality of Shading Scales, derived mainly from the writings of Buck (1948, 1966) and Kinget (1952). Due to the complexity of the rating procedure, only a small subsample ( $n = 70$ ) of drawings from the male and female subjects were used. These results were, therefore, presented as suggestive of an aspect of shading which previously had only been given a cursory empirical treatment (Shershen, 1971).

The most important finding with the Quality of Shading Scales was the fact that such a seemingly abstract aspect of shading could, in fact, be so reliably rated (Ebel interrater reliabilities greater than .70). This finding in and of itself is encouraging for further research with this aspect of shading. However, it should not be too surprising since previous attempts at developing scales of other qualitative aspects of drawings have reportedly been fairly successful (Harris, 1963). The practical usefulness of the Quality of Shading Scales would seem questionable; nevertheless, their utility in drawing research may be important. Perhaps it is the Quality of Shading, which largely influences rater's judgements of intelligence shown in a drawing. It would also be interesting to see if the Quality of Shading would correlate highly with Harris' (1963) Quality Scales of intelligence.

From the intercorrelations and factor loadings of all 10 Quality of Shading Scales (see Tables 52 and 53), it can be observed that QSS 10, by itself, (Poor quality - Good quality) seems to be getting at the global concept of Quality of Shading. Of course, the other scales

add to the concept, but for economy of time in future research, it may prove fruitful to be used alone. In fact, this scale loads highest and seems to adequately describe Factor I, which accounted for 72.7% of the variance. Factor II, accounting for 16.8% of the variance--appears to represent a Neatness or technical facility factor. Factor III, only accounting for 10.5% of the variance, appears to clearly represent a Lightness-Darkness factor, which seems analogous to the intensity aspect of Degree of Shading. Therefore, these finds seem to confirm that Quality of Shading is, in fact, a category largely separate from Degree of Shading.

These results of the factor analysis of the Quality of Shading Scales show that the separate scales comprise different aspects of this category of shading. In further research it may be interesting to use only those highly loaded Quality Scales to determine if prediction of this category of shading can be improved.

Again it should be mentioned that due to the small sample size, the results of the factor analysis should be accepted as being suggestive only. For this same reason, individual factor analyses were not computed for the sexes separately; however, the possibility of sex differences should be determined in any further research with these scales.

### Summary and Conclusions

This last section attempts to summarize all the important results of this study and suggests considerations for further research in this areas.

Since this study attempted to be a thorough investigation of shading in the H-T-P and its relationship to situationally specific anxiety (as well as other major aspects of anxiety, i.e., trait, state, etc.), it employed three different instruments which were purported to measure these varying aspects of anxiety. As well, shading was rated into three separate categories, i.e., Incidence, Degree, and Quality. Wine's (1971) directional-attentional formulation of situationally specific (test) anxiety was proposed to predict shading in subjects' drawings. Briefly, her formulation states that the low-test anxious individual typically performs better than the high-test anxious individual on complex tasks, due to a difference in attentional focus. Since the low-test anxious individual primarily focuses on task relevant cues and the high-test anxious individual focuses on self-referent, evaluative cues, a differential performance results. Because drawing was assumed to be a complex task and shading considered a non-essential, albeit, relevant task cue (i.e., contributing to an adequate performance in a drawing task), it was deduced that interfering, self-referent cues would diminish the addition of shading to a drawing.

From the results of this research, it can be concluded that the application of Wine's directional-attentional formulation of situationally specific anxiety to the prediction of shading in the projective drawing task seems to be generally supported. Directly supporting Wine's formulation were the hypotheses dealing with instruments purported to be situationally specific in scope--i.e., the Achievement Anxiety Test of Alpert and Haber (1960) and the Pre-Drawing Anxiety Questionnaire which was adapted from Liebert and Morris' (1967) Pre-Examination Questionnaire. As predicted, debili-

tating anxiety from the AAT, showed a negative relationship with shading in general, but displayed particular significance on the Quality of Shading for males and on the Degree of Shading for females. Conversely, the facilitating anxiety scale of the AAT showed a general positive relationship with all shading categories, but it was particularly significant for male Quality of Shading.

Similarly, the negative relationship predicted for the Worry scale of the Pre-Drawing Questionnaire and shading, was found in all three samples; however, the relationships were more predictive for females. The Emotionality scale of the Pre-Drawing Questionnaire, also showed this same general trend, i.e., with results being more predictive for females.

As for the previous two situationally specific anxiety scales, hypotheses--along the lines of Wine's directional-attentional formulation--were proposed for Spielberger et al.'s (1970) State-Trait Anxiety Inventory. Due to the equivocal results found in former studies relating trait (general) anxiety and shading, a significant relationship with this variable was not predicted. However, the two negative relationships found, which were significant, show some support for Wine's directional-attentional formulation--even for this aspect of anxiety. On the other hand, the negative relationship predicted between state anxiety and shading, only held for the Total and Male Quality of Shading category. For the Male Degree of Shading category, there were found positive and significant relationships with state anxiety. It was, therefore, concluded that state anxiety as measured by the STAI-S, which Spielberger et al. (1970) claim can be used as an index of Hull-Spence drive, is predictive of shading for males, but not for females.

The argument proposed to explain the sex difference in predictiveness between Spielberger's STAI-S and the other two situationally specific scales was the fact that although the STAI-S is intended to be used as a measure of anxiety in specific situations, it is not as situationally specific to a testing situation as the AAT or the Pre-Drawing Anxiety scales are to the drawing task. From this, it was concluded that males and females seem to respond differently in regard to the overtness of the questionnaire.

The results of this study in regard to the relationship between shading and anxiety seem to have shed some light on the conflicting findings in the literature of both positive and negative relationships. Wine's directional-attentional formulation of situationally specific anxiety, as applied to the drawing task, gives a logical rationale for obtained negative relationships; positive relationships, on the other hand, may have been the result of measuring anxiety as drive. However, in future research with shading and anxiety, it is suggested that the results should be interpreted as to category of shading, type of anxiety measured, and sex of the subjects.

Since it was felt that variables other than anxiety were also related to shading, drawing interest, drawing evaluation, and drawing time were included. A motivational interpretation of shading in a drawing was proposed and supported by the general positive relationships found between these variables and the Degree and Quality of Shading. All these variables

seem to represent the amount of effort a subject is willing to invest in a drawing task. Therefore, it can be concluded that Degree and Quality of Shading are possibly indirect measures of involvement in a drawing task.

Two other variables, formal drawing instruction and intelligence, also showed predictable relationships with shading. Formal drawing instruction showed a general positive relationship with Degree and Quality of Shading, but particularly on Degree of Shading for the males. Previous findings for the relationship between shading and intelligence generally have been nonsignificant; however, this research found a positive relationship between intelligence and Quality of Shading. A general negative and nonsignificant trend was found for Degree of Shading. It was therefore concluded that more specificity in the type of intelligence measured, as well as in the specific category of shading, would probably produce more consistent results with these variables.

The remainder of this research demonstrated--through a multivariate approach--that the prediction of Degree and Quality of Shading could be improved by employing predictor variables other than anxiety. Prediction was, in fact, improved--up to .54 for Degree H-T-P and up to .66 for Quality H-T-P. However, caution must be used since these high multiple correlations failed to cross-validate. Nevertheless, the cross-validated multiple  $R$ 's were found to hold up better within the Female sample, rather than in the Male or Total sample. Although, statistically, sex could not be considered a moderator variable, generally higher reliabilities for the females on the predictor and criterion variables was a possible explanation for these results.

From the findings of this study, it can be concluded that a variable as seemingly "fuzzy" as shading in a projective drawing, is, in fact, a researchable variable which can be fairly well predicted in a university sample by using a multivariate approach. It seems that to have assumed an isomorphic relationship between a complex drawing characteristic and one particular variable, i.e., anxiety, was both fruitless and simplistic. Nevertheless, this research does not claim to have been exhaustive as to the number of possible variables related to shading in projective drawings. Other variables such as hostility, depression or preference for figural complexity-simplicity, may also show significant relationships. These variables have yet to be explored in further research, along with refinement of the measurements of the three shading categories.

In summary, it is felt that this research has illuminated the shading-anxiety problem somewhat--in view of the shadow of male-female differences. In particular, the proposal of a theoretical rationale for the obtained results, makes shading more logically predictable. Furthermore, the proposed motivational interpretation of shading contributes more to its understanding. Finally the use of a multivariate approach added much to the prediction of shading as a projective drawing characteristic. This approach is suggested for further research with shading, as well as for the study of other characteristics of projective drawings.

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APPENDIX A

Achievement Anxiety Test (AAT)

Course Examination Attitude Questionnaire

This questionnaire asks about certain of your personal feelings, attitudes, and experiences about course examinations. Some of the questions refer to your past experiences with examinations; when you answer these, think back to your school examinations of the last couple of years. Obviously there are no "right" or "wrong" answers to any of these kind of questions. They merely offer an opportunity to express feelings and attitudes with regard to a large range of situations. Again, the value of the results of this questionnaire will depend on how frank you are in stating your feelings and attitudes.

Read each statement and set of alternatives carefully. Then select the answer which best describes your own actual feelings or behavior. Blacken in the space on your answer sheet that corresponds to the answer that you have selected. Please be sure to make no marks on this questionnaire.

1. Nervousness while taking an exam or test hinders me from doing well.
  1. Always
  2. Often
  3. Sometimes
  4. Rarely
  5. Never
  
2. I work most effectively under pressure, as when the task is very important.
  1. Always
  2. Usually
  3. Sometimes
  4. Hardly ever
  5. Never
  
3. In a course where I have been doing poorly, my fear of a bad grade cuts down my efficiency.
  1. Never
  2. Hardly ever
  3. Sometimes
  4. Usually
  5. Always
  
4. When I am poorly prepared for an exam or test, I get upset, and do less well than even my restricted knowledge should allow.
  1. This never happens to me.
  2. This hardly ever happens to me.
  3. This sometimes happens to me.
  4. This often happens to me.
  5. This practically always happens to me.

5. The more important the examination , the less well I seem to do.
  1. Always
  2. Usually
  3. Sometimes
  4. Hardly ever
  5. Never
  
6. While I may (or may not) be nervous before taking an exam, once I start, I seem to forget to be nervous.
  1. I always forget.
  2. Usually.
  3. Sometimes
  4. I often feel some nervousness.
  5. I am always nervous during an exam.
  
7. During exams or tests, I block on questions to which I know the answers, even though I might remember them as soon as the exam is over.
  1. This always happens to me.
  2. This often happens to me.
  3. This sometimes happens to me.
  4. This hardly happens to me.
  5. I never block on questions to which I know the answers.
  
8. Nervousness while taking a test helps me to do better.
  1. It never helps.
  2. It usually doesn't help.
  3. Now and then it helps.
  4. It generally helps me a little.
  5. It often helps.
  
9. When I start a test, nothing is able to distract me.
  1. This is always true of me.
  2. This is often true of me.
  3. This is sometimes true of me.
  4. This is hardly ever true of me.
  5. This is not true of me.
  
10. In courses in which the total grade is based mainly on one exam, I seem to do better than other people.
  1. Never
  2. Hardly ever
  3. Sometimes
  4. Quite often
  5. Almost always

11. I find that my mind goes blank at the beginning of an exam, and it takes me a few minutes before I can function.
  1. I almost always blank out at first.
  2. I usually blank out at first.
  3. I sometimes blank out at first.
  4. I hardly ever blank out at first.
  5. I never blank out at first.
  
12. I look forward to exams.
  1. Never
  2. Hardly ever
  3. Sometimes
  4. Usually
  5. Always
  
13. I am so tired from worrying about an exam, that I find I almost don't care how well I do by the time I start the test.
  1. I never feel this way.
  2. I hardly ever feel this way.
  3. I sometimes feel this way.
  4. I often feel this way.
  5. I almost always feel this way.
  
14. Time pressure on an exam causes me to do worse than the rest of the group under similar conditions.
  1. Time pressure always seems to make me do worse on an exam than others.
  2. Time pressure often seems to make me do worse on an exam than others.
  3. Time pressure sometimes seems to make me do worse on an exam than others.
  4. Time pressure hardly ever seems to make me to worse on an exam than others.
  5. Time pressure never seems to make me do worse on an exam than others.
  
15. Although "cramming" under pre-examination tension is not effective for most people, I find that if the need arises, I can learn material immediately before an exam, even under considerable pressure, and successfully retain it to use on the exam.
  1. I am always able to use the "crammed" material successfully.
  2. I am usually able to use the "crammed" material successfully.
  3. I sometimes can use the "crammed" material successfully.
  4. I hardly ever use the "crammed" material successfully.
  5. I am never able to use the "crammed" material successfully.

16. I enjoy taking a difficult exam more than an easy one.
1. Always
  2. Often
  3. Sometimes
  4. Rarely
  5. Never
17. I find myself reading exam questions without understanding them, and I must go back over them so that they will make sense.
1. Never
  2. Rarely
  3. Sometimes
  4. Often
  5. Almost always
18. The more important the exam or test, the better I seem to do.
1. This is true of me.
  2. This is true of me much of the time.
  3. This is sometimes true of me.
  4. This is rarely true of me.
  5. This is not true of me.
19. When I don't do well on difficult items at the beginning of an exam, it tends to upset me so that I block on even easy questions later on.
1. This never happens to me.
  2. This very rarely happens to me.
  3. This sometimes happens to me.
  4. This frequently happens to me.
  5. This almost always happens to me.
20. I feel that if I were not surrounded by competitors in an exam situation,
1. I would do much better.
  2. I would do a little better.
  3. It wouldn't make much difference.
  4. I wouldn't do quite as well.
  5. I wouldn't do anywhere near as well.

APPENDIX B

Pre-Drawing Questionnaire (PDQ)

Year entered \_\_\_\_\_ Student No. \_\_\_\_\_ Age \_\_\_\_\_ Sex: M or F  
 Course \_\_\_\_\_ Date \_\_\_\_\_

### Pre-drawing Questionnaire

I. Directions: Read each of the following statements carefully. After each item, indicate how you feel right now in relation to the upcoming drawing task in this class. Use the following numerical scale:

1. The statement does not describe my feeling, condition, etc.
2. The feeling, condition, etc., is barely noticeable.
3. The feeling, condition, etc., is moderately intense.
4. The feeling, condition, etc., is strong.
5. The feeling, condition, etc., is very strong.

\_\_\_\_\_ I do not feel very confident about my performance on this task.

\_\_\_\_\_ I am so nervous that I cannot remember things which I really know.

\_\_\_\_\_ I feel my heart beating fast.

\_\_\_\_\_ I feel I may not be as well prepared for this task as I could be.

\_\_\_\_\_ I am so tense that my stomach is upset.

\_\_\_\_\_ I am worrying a great deal about this task.

\_\_\_\_\_ I have an uneasy, upset feeling.

\_\_\_\_\_ I find myself thinking of how much brighter the other students are than I am.

\_\_\_\_\_ I am thinking of the consequences of doing poorly on this task.

\_\_\_\_\_ I feel very panicky about doing this task.

### Drawing Self-evaluation

Part II. On the scales below, please rate yourself on how well you think you draw. No false modesty or exaggeration. Try to give yourself an accurate rating. Circle the appropriate number below which indicates how well you think you draw in general.

7	6	5	4	3	2	1
Very well	Well	Above average	Average	Below average	Poorly	Very poorly

### Drawing Task Expectancy

Part III. How well do you think you will do on this particular drawing task?

7	6	5	4	3	2	1
Very well	Well	Above average	Average	Below average	Poorly	Very poorly

APPENDIX C

State-Trait Anxiety Inventory (STAI)

# SELF-EVALUATION QUESTIONNAIRE

Developed by C. D. Spielberger, R. L. Gorsuch and R. Lushene

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## STAI FORM X-1

NAME \_\_\_\_\_

DATE \_\_\_\_\_

**DIRECTIONS:** A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you *feel* right now, that is, *at this moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best

	NOT AT ALL	SOMEWHAT	MODERATELY SO	VERY MUCH SO
1. I feel calm . . . . .	(1)	(2)	(3)	(4)
2. I feel secure	(1)	(2)	(3)	(4)
3. I am tense	(1)	(2)	(3)	(4)
4. I am regretful	(1)	(2)	(3)	(4)
5. I feel at ease	(1)	(2)	(3)	(4)
6. I feel upset	(1)	(2)	(3)	(4)
7. I am presently worrying over possible misfortunes	(1)	(2)	(3)	(4)
8. I feel rested	(1)	(2)	(3)	(4)
9. I feel anxious	(1)	(2)	(3)	(4)
10. I feel comfortable	(1)	(2)	(3)	(4)
11. I feel self-confident	(1)	(2)	(3)	(4)
12. I feel nervous	(1)	(2)	(3)	(4)
13. I am jittery	(1)	(2)	(3)	(4)
14. I feel "high strung"	(1)	(2)	(3)	(4)
15. I am relaxed	(1)	(2)	(3)	(4)
16. I feel content	(1)	(2)	(3)	(4)
17. I am worried .	(1)	(2)	(3)	(4)
18. I feel over-excited and rattled	(1)	(2)	(3)	(4)
19. I feel joyful ...	(1)	(2)	(3)	(4)
20. I feel pleasant ..	(1)	(2)	(3)	(4)



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**SELF-EVALUATION QUESTIONNAIRE**

**STAI FORM X-2**

NAME \_\_\_\_\_ DATE \_\_\_\_\_

**DIRECTIONS:** A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you *generally* feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel.

	ALMOST NEVER	SOMETIMES	OFTEN	ALMOST ALWAYS
21. I feel pleasant	①	②	③	④
22. I tire quickly	①	②	③	④
23. I feel like crying	①	②	③	④
24. I wish I could be as happy as others seem to be	①	②	③	④
25. I am losing out on things because I can't make up my mind soon enough	①	②	③	④
26. I feel rested	①	②	③	④
27. I am "calm, cool, and collected"	①	②	③	④
28. I feel that difficulties are piling up so that I cannot overcome them	①	②	③	④
29. I worry too much over something that really doesn't matter	①	②	③	④
30. I am happy	①	②	③	④
31. I am inclined to take things hard	①	②	③	④
32. I lack self-confidence	①	②	③	④
33. I feel secure	①	②	③	④
34. I try to avoid facing a crisis or difficulty	①	②	③	④
35. I feel blue	①	②	③	④
36. I am content	①	②	③	④
37. Some unimportant thought runs through my mind and bothers me	①	②	③	④
38. I take disappointments so keenly that I can't put them out of my mind	①	②	③	④
39. I am a steady person	①	②	③	④
40. I become tense and upset when I think about my present concerns	①	②	③	④

APPENDIX D

Drawing Interest Scales (DIS)

Year entered \_\_\_\_\_ Student No. \_\_\_\_\_ Age \_\_\_\_\_ Sex: M or F

Course \_\_\_\_\_ Date \_\_\_\_\_

### Drawing Interest Scale

Part I. On the scales below, please rate your interest in doing the previous drawing task. Circle the appropriate number which expresses your interest in the previous drawing task.

Before beginning:

7	6	5	4	3	2	1
Very interested			Moderately interested			Not interested

While drawing:

7	6	5	4	3	2	1
Very interested			Moderately interested			Not interested

After completed:

7	6	5	4	3	2	1
Very interested			Moderately interested			Not interested

Part II. Indicate below any formal instruction in drawing. Circle the number below indicating the highest level of instruction completed.

Type of instruction in drawing:

- 1 None
- 2 Pre-secondary(regular art classes)
- 3 Secondary school(special art courses with drawing instruction)
- 4 Post-secondary school(special art courses with drawing instruction)
- 5 Other(specify) \_\_\_\_\_

Duration of formal instruction in drawing:(Only, if 3, 4, or 5 circled):

- 1 Less than 6 months
- 2 Less than 1 year
- 3 Less than 3 years
- 4 Less than 5 years
- 5 More than 5 years

APPENDIX E

Goldstein and Faterson's (1969) Shading Criteria

Hanna F. Faterson, Ph.D.

Dept. of Psychiatry  
Downstate Medical Center  
450 Clarkson Avenue  
Brooklyn, New York 11203  
March, 1967-January, 1970

Human Figure Drawings: Amount of Shading

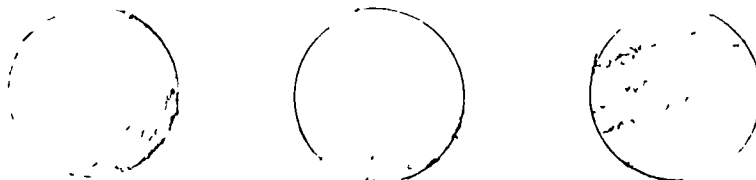
Instructions for Independent Rater

- A. Please read carefully the definition of shading, since it is in some respects different from the usual one.

For purposes of these ratings, shading includes the following: (code numbers on right on this and following pages refer to sample drawings).

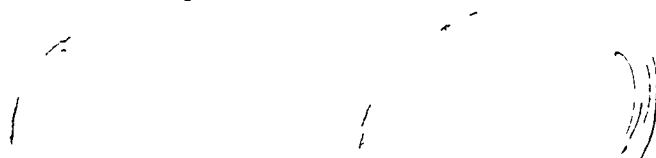
1. Filling in areas (or sub-areas) with sketching or shadowing:

e.g.



2. Making the contours or boundaries of an area, or part of an area, wider by the use of parallel, usually but not always sketch-like, lines:

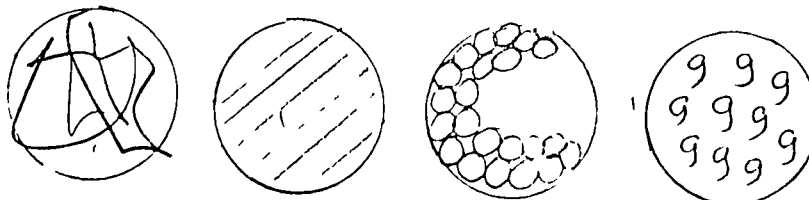
e.g.



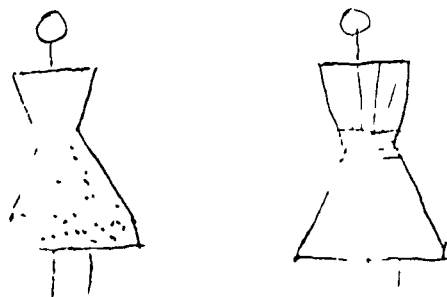
A-2

3. Filling in areas, or parts of areas, with scribbles, lines, or patterns that do not necessarily have the "shading" quality as in (1) above;

e.g.

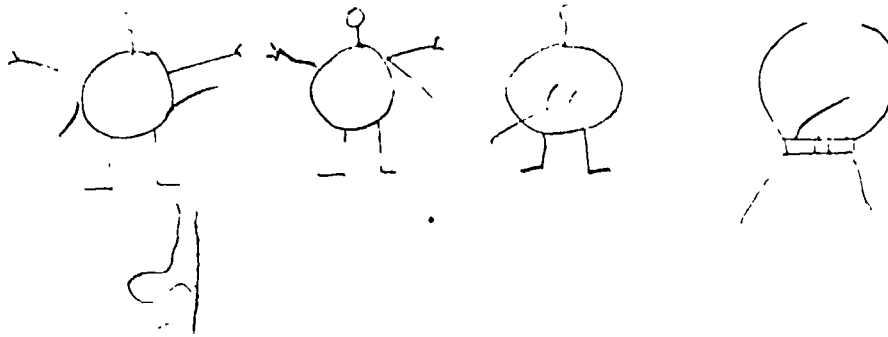


A-3



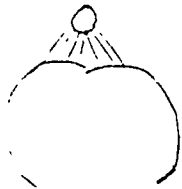
4. Any "extra graphic material" not logically necessary to portray the intended figure. E.g., an extra line or lines extending outward or inward from the contour or boundary of an area or part of an area, and which seems to serve no "useful purpose" (i.e., irrelevant lines):

e.g.



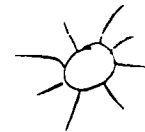
5. Lines, or other graphic indications, with or without enclosing boundary, which are not "extra" in the sense above (under 4), and which one might not ordinarily associate with shading, e.g.,

radiating lines filling in a neck area, e.g.,



or

clip on tie with lines intended to represent the glow or sparkle of a jewel, e.g.,



B. Further general instructions for when to score: presence of shading.

1. Some instances of shading appear to be such an integral part of the representation of the human figure that one might "take it for granted" and deny it the status of shading. The clearest example is hair, where shading is an obvious and logical graphic expression.

Do not overlook such instances, e.g., (*Separate category*)



- 2. Shading is to be rated (if present) whether it is part of the essential representation of the human figure; part of accessories (e.g., cigarette, pocketbook, gun); or part of the background or scene (e.g., landscape, interior of a room; design or scribble outside of the figure itself). Note that if for example a sun is represented and it take this form,



the "rays" are to

B-2

be considered as shading. Use the same criteria for judging shading in accessories and/or background as for figure itself. The overall rating for a figure includes these.

- 3. Note, as already implied in examples under A1 and A3 above, that filling in of an area or part of an area (e.g., whole body, or part of the body, tie, socks, etc.) is considered as shading whether or not it is a

complete filling in

or

sparse filling in



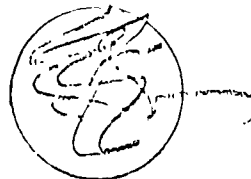
Both of these are considered as shading, though obviously differing in amount.

- 4. Disregard the kind or quality of the shading; i.e., whether it is heavy (black) or light (light faint gray); whether it takes the form of

stylized patterning with careful execution

or

random hectic scribbling

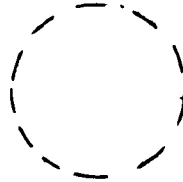
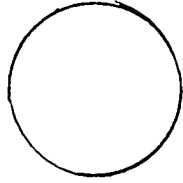


C. Instructions for judging amount of shading.

(After preliminary practice) you will be asked to sort drawings of male figures into 5 groups, according to the amount of shading shown in each, from minimal amount (rated 1) to maximal amount (rated 5).

1. Minimal amount of shading (rated 1) includes

(a) drawings with NO shading at all, executed in a clear, uncluttered boundary line for both total figure and parts of figure, without sketching or filling in of areas, and without "extraneous" lines as in (c)



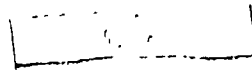
C-1-a

(b) drawings with literally a minimal amount of shading (e.g. hair area shaded, but total hair area very small); or perhaps in addition

nose or mouth is shaded

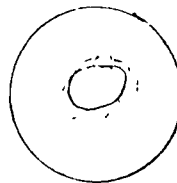
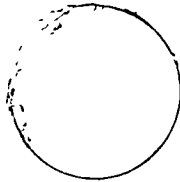
or

belt buckle



C-1-b

(c) drawings with small amount of sketching in an otherwise uncluttered boundary of figure or part of figure, e.g.,



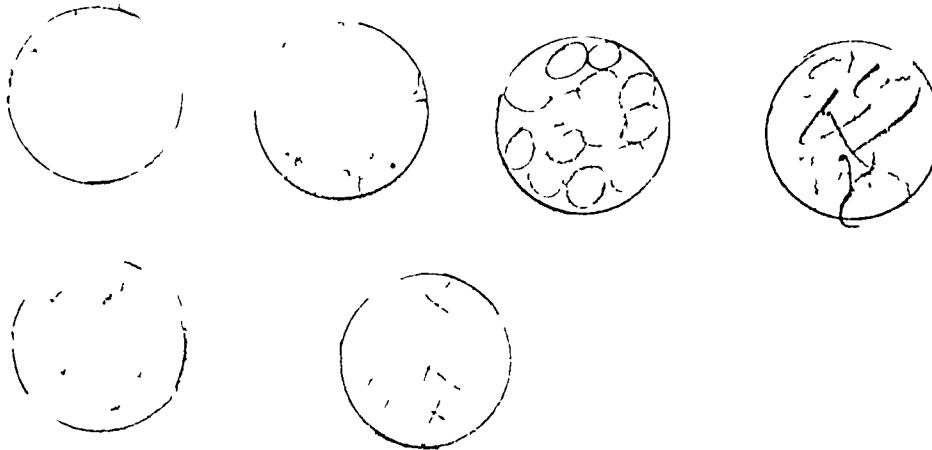
(d) drawings with an extraneous line or lines, in conformity with "extended" definition of shading given on p.1 (A4), e.g.



2. Maximum amount of shading (rated 5)

- (a) It is seldom that the whole figure, including the face, is shaded, although it does happen. The definition of a rating of "5" as restricted to such "total" shading would be too narrow a criterion. Rather, include under rating 5 drawings in which shading is characteristically pervasive, even though not omnipresent. E. g.

C-5



- (b) Maximum shading may occur in drawings which do not have specifically indicated boundaries.

C-5-b

- (c) A sketching of boundary lines, when such sketching takes the form of multiple, usually overlapping lines, may result in such a broadened boundary area that such sketching "spills over" into the whole area, rather than being restricted to broadening the contour.



With these definitions of extremes of amount of shading, you are asked to sort the drawings of male figures into 5 groups, ranging from minimum amount at one extreme to maximum amount at the other extreme. The drawings in each group should be consistent with each other as to amount of shading shown. (Refer frequently to the actual example of figure drawings appended to illustrate the amount of shading in each group.)

Groups 2, 3 and 4 are less easily definable in terms of specific criteria of amount. Two drawings, each rated "3" by 2 raters working independently, are appended.

In general, consider the "total impact" of amount of shading to go into each group and the consistency within each group. I.e., each drawing in a given group should "belong" with others in the group as to amount of shading, more than to the adjacent group or groups.

Try to keep the 5 groups approximately equal.

D. Additional comments.

1. It seems essential for rater or raters to do preliminary practice ratings before tackling the "experimental" group. If 2 raters are used, it is essential that they understand and interpret the instructions in the same way. With this precaution, we obtained, for 97 drawings, complete agreement between 2 raters for 69% of the drawings and a 1-step disagreement for 28%.

2. As to procedure, we found it advisable, as stated in instructions, to sort into groups, rather than to assign ratings to successive drawings. This procedure facilitates consistency of rating. A large library table, on which the groups of drawings can be spread out, is most convenient.

3. In our use of the procedure, we tried to make the amount-of-shading groups approximately equal. This may or may not be the best procedure for all research requirements.

4. Sets of drawings obtained from different subject groups may vary in over-all amount and range of amount of shading used. For our group of 97, 5 steps seemed adequate. For another set of 160 drawings, in which the range was smaller, 3 steps were more appropriate.

5. The two sex figures drawn by one S may contain quite different amounts of shading. We rated the male and the female drawings separately. If an amount-of-shading rating based on both figures is desired, one of two procedures may be followed: (a) a rating based on both figures may be assigned to each subject, or (b) each drawing of a set may be rated separately, and the two ratings averaged.

APPENDIX F

Quality of Shading Scales (QSS) Rating Forms

### Guidelines for the Quality of Shading Scales

Very Light - Very Heavy - refers to the general intensity of the shading in the whole drawing.

Uniform-in-type - Varied-in-type - refers to the different types of shading which could be drawn, i.g., scribbling, patternal lines, criss-crossed patterns, solid covering of an area, side of pencil highlighting, three-dimensional effect, etc.

Two-dimensional - Three-dimensional - refers to the flatness or depth producing effect of the shading. Overall is the shading flat or does it indicate volume, depth, or mass?

Appropriately used - Inappropriately used - refers to the judicious employment of shading. Is it used purposefully or merely to fill up space? Too much, too little, or just right?

Ordinary - Artistic - refers to the style and facility of shading. Is it conventional, common place or is it executed with style and flair?

Enhancing - Detracting - refers to that property of shading to add to or detract from the overall quality of drawing (without shading). Does the shading embellish or detract from the drawing?

Controlled Strokes - Random Strokes - refers to the direction, regulation, and coordination of the shading product, or the lack of these characteristics. Is the shading orderly or loose (haphazard)?

Reinforced - Unreinforced - refers to the amount of repetition of strokes with which the shading is produced. Is it produced easily, or is it constantly worked over?

Overly meticulous - Sloppy - refers to the care with which shading is applied the drawing. Is it neat or messy?

Poor Quality - Good Quality - refers to those global aspects of shading which either add to or detract from the overall quality of a drawing which contains no shading. Although this scale is similar to the Enhancing - Detracting scale, this scale should be greater than the sum of the parts.





















## APPENDIX G

### Degree of Shading Extended Definition and Criteria

### Definition of Shading

For this research, the definition of shading by Jones and Thomas (1963, 1965), "markings... which in any degree denote(d) or emphasize(d): (1) a third dimension or different plane; (2) differences in lightness or darkness; or (3) difference in texture." (p. 104; 265; respectively)

Furthermore, the illustrated criteria of Goldstein and Faterson (1967), which includes "... filling in areas, or parts of areas, with scribbles, lines, or patterns that do not necessarily have the 'shadowing' quality..., as well as sketching of contours and boundaries," will be followed. An exclusion to this latter criterion will be that fill-in markings should not be rated as shading if they can be considered elaborated details. When in doubt about this matter, consider the markings as shading. (p. 1)

On the Person, hair shading will be judged as a separate category following the illustrated criteria of Goldstein and Faterson (1967). Never-the-less, hair shading will be included in the Degree of Shading ratings.

### Special Considerations for Judging Shading of Person (Jones & Thomas, 1965)

"Shading as it applies to figure drawings in general consists of pencil strokes ... which produce darkened areas or contrasting degrees of lightness and darkness. The effect of such shading must denote or emphasize: (a) body -- a third dimension or different planes between body areas or parts of areas (i.e., breasts, genital areas, musculature and so on): a difference in surface texture (body hair, for example); (b) clothing -- folds or creases, differences in texture, plane or color, but not a delineation of a detailed part of the clothing.

"In judging shading it is essential to adhere to an explicitly detailed definition. Therefore, for the purposes of coding, shading must be distinguished from lines drawn in error, and from lines delineating a part of clothing or an exposed part of the body within a figure boundary. Shading includes the following markings.....:

- a. a few suggestive lines, subtle or dim
- b. massed lines
- c. scribbles

"Care must be exercised to distinguish between shading and other lines which indicate clothing transparency. Diagonal or similar lines on ties often represent design rather than shading. Lines between outlines of a belt, for the most part, are shading lines.

"As a few instances of shading, lines denoting a difference in plane and light reflections, as classified under the preceding definition, are to be especially noted: (a) a crease line in trousers, but not lines outlining the stitching or edge of the fly on trousers, (b) one or two lines on the sleeve at the inside of the elbow, (c) line or lines under the breasts of the female figure, (d) a line or curve at the base of a figure." (pp. 266 - 267)

### Degree of Shading

independently,  
Each quadrant is to be rated <sup>^</sup> as a whole, according to the following weights:

- 0 - no shading
- 1 - light shading in a small area (less than one-fourth of the drawing area \*)
- 2 - light shading in a large area (one-fourth or more of the drawing area)
- 3 - moderate shading in a small area (less than one-fourth of the drawing area)
- 4 - moderate shading in a large area (one-fourth or more of the drawing area)
- 5 - heavy shading in a small area (less than one-fourth of the drawing area)
- 6 - heavy shading in a large area (one-fourth or more of the drawing area)

\* Drawing area = the entire quadrant, i.e., 1/4 of the whole drawing page.

### Degree of Shading

No shading - when none of the <sup>specified</sup> ~~above~~ criteria are present in a drawing area.

Light shading - shading is rated as light when the ratio of white space to gray penciling in a given area\* is predominated by white space.

Moderate shading - shading is rated as moderate when the ratio of white space to gray gray penciling in a given area is approximately equal.

Heavy shading - shading is rated as heavy when the ratio of white space to gray penciling in a given area is predominated by gray penciling.

\* Given area = the area encompassing the shaded portions of a drawing.

Mixed shading = when shading is mixed (i.g., mod. & heavy) in a given area, rate the penciling which is predominate.

## APPENDIX H

Shading in the H-T-P: Its relationship to situationally  
specific anxiety and other variables in a male  
and female Canadian university sample

## APPENDIX H

## ABSTRACT OF

Shading in the H-T-P: Its relationship to situationally  
specific anxiety and other variables in a male  
and female Canadian university sample<sup>1</sup>

Due to conflict between the clinically used anxiety interpretation of shading in the H-T-P and research findings, this study was designed to be comprehensive yet specific in scope. Both shading and anxiety were considered as complex variables and were measured as such. Shading was rated into three categories: Incidence (presence or absence), Degree (amount and intensity), and Quality ("goodness" or "poorness") of shading. Anxiety, with its varying elements of situational specificity, was measured by three instruments, purporting to tap these components: the State-Trait Anxiety Inventory, the Achievement Anxiety Test, and the Pre-Examination Questionnaire. In addition, other variables such as drawing interest, drawing competency, drawing time, formal drawing instruction, intelligence, and sex, were also included in the study.

Wine's (1971) directional-attentional formulation of situationally specific anxiety and a proposed motivational interpretation of shading were employed to attempt prediction of shading in subjects' drawings. Briefly, Wine's formulation states that the low-test anxious individual typically performs better than the high-test anxious

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<sup>1</sup> Eugene D. Shershen, Doctoral thesis presented to the School of Graduate Studies of the University of Ottawa, Ontario, Canada, December 1975, xii - 215 p.

individual on complex tasks, due to a difference in attentional focus between self- and task-cues. Since drawing was considered a complex task, and shading a relevant task cue, this formulation appeared to be applicable. The proposed motivational interpretation considered shading as directly related to interest or involvement in the drawing task. Both of these formulations contributed to the generation of 13 hypotheses.

The hypotheses were tested in a correlational design which consisted of administering the H-T-P and other instruments to 367 university students of both sexes. Results of the statistical analyses generally supported the proposed hypotheses. Contrary to clinical interpretation, but as predicted by Wine's directional-attentional formulation, there was a general negative relationship found between all three shading categories and anxiety. The only exception was a general positive relationship between male state anxiety and Degree of Shading. The motivational interpretation predicted and found a general positive relationship between shading and interest in the drawing task for the Total, Male, and Female samples.

Results varied somewhat according to the category of shading; Incidence of Shading proved least predictable. Subsequent multivariate analyses of Degree and Quality of Shading increased prediction of shading and contributed to explaining variable interrelationships. It was shown that variables such as drawing time, drawing interest, drawing competency, and formal drawing instruction were generally more predictive of shading than anxiety.

Sex differences were found throughout this research. Results within the female sample were shown to be more reliable and predictive. It was concluded that sex is an important variable to consider in future research on shading.

It was further concluded that, although specificity of anxiety increases the predictableness of shading in drawings, a multivariate approach appears to be more fruitful--particularly in the light of a theoretical rationale. Application of this approach was suggested for other drawing characteristics.