Female competitive task persistence as a function of sex-role orientation and prior success and failure.

Judith G. Levy

University of Massachusetts Amherst
FEMALE COMPETITIVE TASK PERSISTENCE AS A FUNCTION OF SEX-ROLE ORIENTATION AND PRIOR SUCCESS AND FAILURE

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Judith G. Levy

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Approved as to style and content by:

Barbara F. Turner, Chairperson
Bernadette Nelson-Shapiro, Member
Jean Leppaluoto, Member

Jerome L. Myers
Chairman, Psychology

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Psychology
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ABSTRACT

Forty-eight college women selected on the basis of traditional or nontraditional scores on the Wellesley Role Orientation Scale, a measure of sex-role orientation, worked on line puzzles both alone and in competition with a male confederate. Between the noncompetitive and competitive sessions subjects were randomly assigned to either a success, failure, or control group in which they practiced on easy, insoluble, or unrelated puzzles respectively. Persistence at an insoluble puzzle was measured in each session as an indicant of achievement motivation. Initial baseline persistence, as well as changes in persistence in competition were examined as a function of sex-role orientation and practice condition.

Results indicated no differences in initial persistence for the traditional and nontraditional groups, with a drop in persistence in competition for the traditional group in the success condition, supporting the hypothesis of achievement ambivalence after success for traditional women. Interpretation of results was complicated, however, by the questionable effectiveness of the experimental manipulation, and by changes in task demands during the competitive session. Suggestions for future research on achievement in women are discussed.
# Table of Contents

**CHAPTER 1**  
INTRODUCTION  

**CHAPTER 2**  
METHODS  

**CHAPTER 3**  
RESULTS  

**CHAPTER 4**  
DISCUSSION  

**APPENDICES**  

**REFERENCES**
LIST OF TABLES

Table 1- Experimental Design.................................21
Table 2- Incidence of Fear of Success in the .................27
Entire Sample
Table 3- Repeated-Measures Analysis of Variance.............35
of Number of Attempts at Insolvable Puzzle
Table 4- Repeated-Measures Analysis of Variance.............36
of Time Spent at the Insolvable Puzzle
Table 5- Repeated-Measures Analysis of Variance.............37
of Work Rate
Table 6- Mean Amount of Time Spent During the...............39
Noncompetitive and Competitive Sessions
Table 7- Mean Change in Number of Attempts Computed.......41
from $z$-Scores from the Noncompetitive
to Competitive Session
Table 8- Mean Change in Time Spent Computed from..........44
$z$-scores from the Noncompetitive to
Competitive Session
Table 9- Analysis of Covariance of Number of ...............47
Attempts during Competition Controlling
for NCS Performance
Table 10- Mean Number of Attempts in Competition...........48
adjusted for Initial NCS Performance
Table 11- Analysis of Covariance of Time Spent during......50
Competition Controlling for NCS Performance
Table 12- Percentage of Win/Lose Predictions Among........52
the Experimental Practice Groups
Table 13- Mean Win/Lose Prediction Scores....................54
LIST OF FIGURES

Figure 1 - Puzzle sets presented to subjects.................30

Figure 2 - Mean Number of attempts in Non-competitive.......43
          and Competitive Sessions

Figure 3 - Mean Time Spent in Non-competitive.............45
          and Competitive Sessions
LIST OF APPENDICES

Appendix A - Subject phone solicitation ......................... 68
Appendix B - Questionnaire Form ................................. 69
Appendix C - Questionnaire Feedback ................................ 79
Appendix D - WROS distribution for the entire female population 82
Appendix E - Description of experimental practice groups ... 83
Appendix F - Post-experimental questionnaire ..................... 84
Appendix G - Post-experimental feedback ........................ 85
Appendix H - Correlation matrix for the entire sample ......... 87
Appendix I - Correlation matrix for the traditional sample .... 89
Appendix J - Correlation matrix for the non-traditional sample .. 91
CHAPTER 1

In American culture successful achievement has traditionally been defined as both important and as male-appropriate, creating a double-bind for women. Hence, during the last ten years of renewed interest in female achievement, many researchers have investigated the general hypothesis that female behavior in achievement situations reflects psychological conflict. Continuing this line of investigation, this study examines female achievement behavior both alone and in competition with a male as a function of sex-role orientation and prior success and failure. Since a history of unclear findings resulted when female achievement motivation was measured projectively as an index of achievement behavior (Alper, 1974), the major dependent variable used in this study is task persistence, "the principal behavioral indicator of aroused motivation" (Stein & Bailey, 1974). Conflict is predicted to be reflected by an inhibition, or decrease in persistence from an initial noncompetitive to a subsequent competitive session.

There is evidence that female achievement is currently less unacceptable as female employment rates rise, the birth rate declines, and groups of women attempt to deal with the conflicts of outmoded sex-role standards (Luria, 1974; Carden, 1973). Given the rapidly changing nature of social attitudes toward "woman's place", one would expect female
achievement behavior, as measured by task persistence, to be quite heterogeneous. In this study, sex-role orientation, measured by the Wellesley Role Orientation Scale (Alper, 1973) was related to female achievement variability.

An attempt was made to also include fear of success as an independent variable (measured projectively by negative stories written to a sentence cue describing a number-one ranking female medical student; Horner, 1968). However, a low occurrence of fear of success in the available sample made this impossible. Since "fear of success" has been an important theoretical concept in recent work on female achievement, it will nevertheless be discussed and evaluated in this thesis.

A large body of theoretical and empirical literature suggests sex-role orientation and fear of success to be important determinants of female achievement behavior, but few studies have examined these variables while manipulating other situational factors. The importance of prior success and failure on future task performance would be predicted by several theoretical perspectives - e.g. operant learning theory, expectancy-value theory of motivation (McClelland, Atkinson, Clark, & Lowell, 1953). Success is expected to enhance, and failure to detract from future performance. The literature on female achievement, however, suggests the opposite prediction for women who have ambivalence about
doing well. This study examines whether women who differ in sex-role orientation react differently to this situational manipulation.

All subjects were tested both alone and in competition with a male, since the latter situation is traditionally expected to elicit conflict and performance inhibition in women. Few studies have explicitly tested this hypothesis by testing the same subjects in both competitive and non-competitive situations. The use of such a repeated-measures design permits the use of each subject as her own ability control so that changes in task persistence (assumed to reflect inhibition) may be calculated, as well as initial differences in persistence.

Investigations such as this, of individual barriers to maximal performance, do not preclude consideration of the legal, economic and political barriers to success for women in our society. Through empirical work, however, relevant individual and situational correlates of achievement ambivalence can be delineated to critically evaluate the stereotypes and assumptions that abound in this area. Competition with men, in experimental situations has not consistently been shown to elicit female achievement ambivalence (Horner, 1968; Karabenick, 1972; Weiner, 1966). Continued research will thus facilitate a careful evaluation of stereotypes and a separation of the individual factors
from the political, economic, and legal factors that limit successful achievement.

Achievement and the Female Sex-role

Margaret Mead (1949) was the first to elaborate a social role interpretation of sex differences in achievement, and indeed is the "foremother" of current sex-role achievement research. She proposed that intellectual and competitive striving is omitted from the female role because it elicits negative reactions from males. A wide range of evidence supports the importance of sex-role orientation to achievement motivation and behavior in women. Sex-role ideology, defined as "a woman's system of beliefs regarding the appropriate behavior of women with respect to men" was an accurate predictor of female values and behavior (Lipman-Blumen, 1971, p. 34-35). A "contemporary" ideology was reflected in higher educational goals and a preference for direct achievement over vicarious achievement via the accomplishments of one's husband.

Alper (1973) has found consistent relationships between sex-role orientation, as measured by the Wellesley Role Orientation Scale (WROS), and achievement imagery in projective measures (though not specifically the Horner projective cue). "Low feminines" (those with a nontraditional sex-role orientation) wrote significantly more success stories, containing themes of achievement, hard work and
competition than "high feminines" (traditionals). Characters in stories by "highs" often worked for affiliative goals, worked to help men, or worked harder than men to succeed. Although both highs and lows wrote "danger of success" stories, for highs the danger was interpersonal for the achiever, whereas for lows the danger was that the project would fail. Presumably it is the high feminines who would worry about negative interpersonal consequences of success, and inhibit achievement behaviors when competing against a male. The college grades of the low WROS scorers tended to be higher than the high WROS scorers, indicating that successful achievement imagery is backed up with successful achievement behavior. Regarding plans for one year after graduation, highs were more likely to expect and prefer marriage or a job only to graduate school. Lows were more likely to favor graduate school (Alper, 1973, 1974).

Lesser, Krawitz, and Packard (1963) found that high achieving female high school students responded to female cues with increased achievement imagery while low achieving female high school students of equal ability responded to male cues with increased achievement imagery.

It appears that the girl who retains a perception of the female role as including intellectual achievement goals succeed intellectually under conditions of strong academic competition with other girls; by comparison the girl who accepts the social prescription that intellectual achievement strivings are relevant to the male role and not the female role does not succeed as well in
intellectual competition with other girls. 
(Lesser et. al., 1963, p. 64)

Carey (1958) found an improvement in female problem-solving performance after group discussions to improve females' attitudes toward intellectual accomplishments. There was no improvement in male performance after these discussions, indicating that only the females had not previously been performing to capacity. Milton (1957) reported a positive relationship between masculine sex-role identification and problem-solving skill both within and between sexes, but Hoffman and Maier (1966) failed to replicate these results.

In research with elementary school age children the description of a task as "masculine" or "feminine", as well as the subjects' sex-role standards for achievement, influenced attainment value of success and expectancy of success - factors related to achievement behavior (Stein, Pohley & Mueller, 1971; Stein, 1971; Crandall, Katkovsky & Preston, 1960).

Female Performance in Competition With Males

Although it is commonly assumed that female achievement efforts are inhibited by competition with males, research findings are by no means conclusive. Factors such as the sex-appropriateness of the task, degree of familiarity with the competitor, and the "stakes" involved all must play a role. Yet few studies have manipulated these vari-
ables, and base rates of subject ability level have rarely been obtained.

There is evidence that females will inhibit achievement efforts when they are superior to a male. When Weiss (1962) rigged a "dynometer" measuring hand strength so that female subjects appeared to be stronger than a male confederate, a small but significant decrement in female effort occurred. An increase in "emotional expressiveness" was noted in a post-experimental session as an attempt by the subjects to reassert their "femininity". The results of this study, however, must be evaluated in terms of the clearly masculine nature of a task measuring physical strength.

On a more neutral task, Morgan and Mausner (1973) report a similar trend in a high school sample. Their study is especially significant because they controlled for individual ability level and measured projective fear of success with Horner's (1968) sentence cue. Male-female pairs of high and low ability were formed on the basis of previous performance on Part 1 of the Hidden Figures Test (HFT), a measure of field dependency reflecting stable individual ability differences. Prior to the team session each subject was privately given both his and his partner's score on the initial test, and led to believe that his/her partner was unaware of the results. The pairs were told to work cooperatively on the second part of the HFT, while an
observer recorded the level of individual participation, and also the frequency of tension releasing behaviors such as giggling, laughter, and negative self-depreciating remarks.

Low ability boys were incredulous that they were inferior to their female partners and worked hard to disprove their incompetence. Low scoring girls accepted their inferior position and few increased their scores. High ability girls (despite little projective fear of success) either lowered their performance level sufficiently to drop below the boys, or "showed evidence that their superior performance generated considerable tension" (p. 468).

However, since the experimental session "required" cooperation, it is difficult to evaluate female competitive behavior. It is unclear what behaviors would have occurred if the pairs were competing for some desirable prize.

When emotional involvement with the "competitor" was included as an experimental variable (Peplau, 1973), projectively measured fear of success was found to be a significant factor in the anagram performance of college women. Traditional high fear of success women performed at a lower level when they competed against their boyfriends than when they competed with their boyfriends against another couple. The identity of the competitor had little effect on the performance of more "liberated" women.

When females compete in the laboratory against unfamil-
iar opponents, however, performance appears to be unaffected by sex of competitor (Weiner, 1966; Horner, 1968; Karabenick, 1972). (A study by Parker (1971) is an exception which will be discussed later.) It is difficult, however, to evaluate changes in female achievement from noncompetitive to competitive settings because most studies employ between-subject designs that fail to include repeated measures of the same subjects in different situations.

In a post-hoc analysis Horner (1968) tried to relate fear of success scores to female achievement data in competitive and noncompetitive situations. But since her experiment (intended to investigate a different set of questions) did not collect data from subjects in both competitive and noncompetitive situations, it cannot adequately examine this issue. When carefully evaluated, Horner's evidence is indirect and based on limited data.

In the first part of her study large groups of males and females completed a series of projective and ability tests. Scores on a scrambled words test were used as a measure of performance level. In the second experimental session subjects were randomly assigned to one of three experimental conditions: noncompetition, mixed-sex competition, and same-sex competition - and were given an anagrams task (making words using the letters in the word "Generation"), an arithmetic problems task, and the Digit Symbol Substi-
tution Task (derived from the Wechsler-Bellevue Adult Intelligence Scale). There was a high and significant correlation between scores on the scrambled words test in session 1 and the anagrams task in session 2 for both sexes in all experimental conditions combined. However, since the highest correlation ($r = .69$) occurred for subjects in the mixed-sex experimental group, Horner inferred that session 1 was similar enough to a mixed-sex competition to be considered as such. She then compared the anagrams performance of the female noncompetition group to that sample’s scrambled words performance in session 1.

The difference between $Z$-scores on the two measures were obtained and subjects were divided simply into those showing a positive $Z$-score difference ($N=14$), implying they do better working alone than in a competitive group, and those showing a negative difference ($N=16$), implying they perform at a higher level in a competitive group than when working alone. (Horner, 1968, p.112)

Nowhere in her discussion is the magnitude or statistical significance of $z$-score differences mentioned. In addition, in spite of different means and standard deviations (Table 42, p. 197), the male distribution was used for assigning $z$-scores to the female subjects, "in order to avoid the problem that the results would be strongly influenced by one or two subjects in the sample" (Footnote, p. 112). When fear of success imagery was considered for the remaining 28 subjects, "77% of the female subjects high in fear of success imagery performed better in the
noncompetitive condition, while 93% of those low in fear of success imagery performed better, like the men, in the competitive condition" (p. 113).

The small data base and questionable comparability of a mixed-sex group situation to a male-female dyadic competition weaken Horner's conclusions considerably. But since her dissertation was designed to answer a different set of questions, these methodological difficulties are not surprising. Her post-hoc findings have been a heuristic take-off point for appropriately controlled studies specifically designed to deal with these issues.

When Parker (1971) controlled for projective fear of success, sex-role orientation of the task and competition condition, several interesting interactions emerged. Two groups of sixty college women exhibiting high fear of success and low fear of success competed face-to-face with either a man or woman, or worked alone on a anagrams task. The sex-role orientation of the task was manipulated by telling half the subjects that in this task males excel, and half the subjects that females excel due to the differential, spatial and verbal skills of the sexes respectively. There was no main effect of fear of success on anagram performance. However, those high in fear of success imagery performed better when the task was described as feminine; those low in fear of success imagery excelled when the task was de-
scribed as masculine. Thus all forms of competition are not threatening to high fear of success women - only competition in situations incompatible with their perceived sex-role. Sex of competitor also interacted with fear of success. High fear of success women performed best when competing against a woman; low fear of success women performed at their highest level against a man. The studies reported earlier that did not find sex of competitor effects failed to control for within-sex variations of role expectation. There was also some evidence that women worked best against women on feminine tasks, and against men on masculine tasks.

In a study examining attitudes toward competition with boys, sex-role orientation was again a significant factor (Houts & Entwisle, 1968). For girls with a "masculine" sex-role orientation, competitive attitudes were significantly related to grades. No such relation was found for traditional girls, suggesting that competitive feelings toward males were openly expressed by the "masculine" group and inhibited in the more "feminine" group.

Fear of Success

Sex-role orientation in these studies has been measured by overt attitude questionnaires. "Fear of success", in contrast, is measured projectively by scoring stories written to the sentence cue, "After first terms finals Anne finds herself at the top of her med school class", for
negative imagery. Horner (1972) considered the motive to avoid success a "latent, stable, personality disposition acquired early in life in conjunction with sex-role standards". It is considered to be independent of sex-role attitudes acquired in adulthood. In fact, Horner postulated greater fear of success for career-oriented women, because for them professional success is a greater possibility. This view of female achievement ambivalence may be labeled "intrapsychic". In what may be termed the "cultural" point of view, female ambivalence about success is attributed directly to cultural stereotypes and standards currently held by the individual. This view would predict new cultural standards for female achievement to be accompanied by decreases in female achievement ambivalence and an increase in competitive striving.

The relationship between sex-role orientation and fear of success has not been established conclusively. Contrary to the "intrapsychic" view, Alper (1973) and Parker (1971) report fear of success to be associated with traditional sex-role standards. Moore (1971), however, in a sample of law, nursing, and graduate students found no differences in fear of success between the groups, which presumably differ in career "traditionality" for women. Since no measure of sex-role orientation was available in this study, its congruence with projective measures cannot be determined. Wellens (1972) found no relationship between motive to
avoid success and sex-role ideology in a high school senior population. Regardless of fear of success score, females projected more achievement imagery to male stimulus cues than to female cues, similar to French and Lesser's (1964) findings. As mentioned earlier, fear of success was found to be of no behavioral significance by Morgan and Mausner (1973).

**Methodological problems with fear of success research.** Although Horner's work has stimulated considerable research on the dynamics of female achievement, a number of methodological critiques can be leveled at the fear of success literature. Many researchers have failed to replicate Horner's sex difference in fear of success imagery, and the frequency of such stories fluctuates widely from sample to sample (Tresemer, 1974). Female raters have been found to score a higher incidence of fear of success than male raters (Robbins & Robbins, 1974; Tresemer, 1974). Because of the amount of publicity the research has received in popular periodicals (e.g. *MS, Psychology Today*, *Sunday New York Times Magazine*), the authenticity of some of the fear of success stories in current college samples is increasingly open to question (Kimball, 1973; Tresemer, 1974).

In the present study the subjects' perceptions of the experimenter's interests were collected to evaluate the transparency of the Horner cue. Questionnaires indicating
familiarity with "fear of success" research were excluded. Since the projective and attitudinal data were collected independently of the behavioral data, it is assumed that subject familiarity with this research did not bias the experimental data. All protocols were scored by a male and a female rater to eliminate potential sex bias.

In summary, sex-role orientation has been found to significantly affect female achievement attitudes and behavior in a number of studies. Studies of female competition with males do not always reveal female ambivalence, but when variables such as sex-role appropriateness of the task, familiarity with the competitor, and female superiority are manipulated, female behavior is inhibited. Some methodological criticism can be directed at the fear of success measure and the between-subject designs that fail to use subjects as their own ability control in competitive and noncompetitive situations.

Effects of Success and Failure on Female Achievement

Horner (1968) conceptualized fear of success as part of an "expectancy-value" theory of motivation that is sensitive to situational factors. Sex-role standards may also be specific to particular circumstances and situations. There is a dearth of research, however, manipulating situational task factors in conjunction with sex-role orientation and fear of success.
Feather (1966) found directly experienced success or failure to be a more important determinant of future experimental performance than experimentally manipulated expectations of success. Induced failure typically lowered expectations of success and depressed performance. For college men persistence at an insoluble anagrams task was greater after success than failure (Johnson, 1970; Ryckman, Gold & Rodda, 1971). Similarly the performance of college women improved more after success than failure (Feather, 1966). Horner's work would predict a reversal of this trend in competitive situations for "fear of success" women.

In the present study success and failure was manipulated during a five minute practice session that occurred in the interval between the competitive and noncompetitive sessions. The "success" group received three very easy practice puzzles, the "failure" group two insoluble and one moderately difficult puzzle. A control group unscrambled words for a comparable time.

Only one study has examined the effects of success on female performance in competition; this study (Karabenick, 1972) used a within-subjects design. Karabenick measured performance by females before and after an unambiguous success experience when competing against either a male or female competitor. Contrary to expectation, both groups increased in performance; this trend was slightly more
marked in the opposite-sex competition. Perhaps if individual differences in fear of success and sex-role orientation had been measured, different results would have emerged. This was tested in the present study, and a failure condition was added as well.

The Nature of the Task and the Generalizability of Findings

The term "achievement" is usually considered a "general pattern of independent striving for excellence in self-selected areas" (Stein & Bailey, 1973). McClelland et. al. (1958) conceptualized achievement motivation as a relatively stable individual disposition to strive for success in any situation where standards of excellence are applicable. The Crandalls, however, assume motivation to be specific to different achievement areas (Crandall & Battle, 1970; Crandall, Katkovsky & Preston, 1960). For women, sex-role compatibility is clearly one important determinant of achievement area, and many individual preferences must exist within sex-appropriate fields. Within the intellectual achievement area, Crandall and Battle (1970) found "intellectual achievement striving" independent of "academic achievement striving". Individuals showing the former motivation extended intellectual effort in areas not required by their job or school, whereas the latter pattern of motivation was channelled toward activities rewarded in these domains. The strength of achievement striving in
these areas was obtained from self-reports during an interview of subjects in the Fels longitudinal sample; data on experimental achievement behavior were also available. For males academic and intellectual effort were correlated with number of correct anagrams. For females, however, intellectual effort only, was correlated with number of incorrect anagrams, suggesting that female subjects put too much effort in the wrong direction.

What then can persistence on line puzzles in this experiment be expected to show? Task persistence is considered to be: (1) "the principal behavioral indicator of aroused motivation (Stein & Bailey, 1974), and (2) more a function of one's expectancy of success than of objective measures of aptitude, such as IQ (Battle, 1965). Since the task in the present study was described to subjects as one measuring "logical thinking and problem-solving ability", persistence measures should validly reflect the degree to which subjects are motivated to appear "logical", as well as individual expectancies of appearing as such. Since logical thinking and problem-solving are often considered male traits, initial persistence differences were expected in the initial noncompetitive session between subjects with different sex-role orientations. Since logical thinking and problem-solving are widely applicable abilities, persistence in this experiment may generalize to a variety of situations. How-
ever, since performance in an experimental task is unrelated to school rewards, persistence may especially reflect "intellectual" rather than "academic" motivation.

The generalizability of the competitive behavior is probably quite limited. The competitor is a stranger and even though the subjects were told playoffs would be held with the sessions' winners, the consequences of winning or losing had little long range significance. Thus only the most pervasive, general fear of surpassing males was expected to be elicited in this situation. This was expected to be low, but perhaps of differential magnitude for the different sex-role groups.

Self-reported importance of doing well, task enjoyment, and willingness to participate in another similar experiment were also examined as indicants of ambivalence. Horner (1968) found that the importance of doing well varied with fear of success and experimental condition. Those low in fear of success reported a high level of importance in all conditions, whereas success in the competitive sessions (both same-sex and opposite-sex) were less important for high fear of success women. Overall, success was more important for low fear of success subjects. Parker (1971), however, found no differences in self-reported effort or importance on the basis of task-subject sex-role compatibility. Overall, Parker found more reported striving on the
masculine tasks, and a marginal tendency for those working on male tasks and/or against female competitors to report a higher importance of doing well.

The meaning of subjects' self-reported enjoyment has been questioned by Leonard and Weitz (1971), who did not find it to be highly related to task persistence.

A final point to be considered is the ability demands of the task. The task is nonverbal and probably involves spatial abilities, an area in which females are somewhat deficient compared to males (Maccoby & Jacklin, 1974). No data are available on sex differences on this task, or on subjects' prior experience with such problems, but since each subject serves as her own ability control, and only female data are considered, this should not be problematic.

Experimental Design and Hypotheses

The design of the study involves two between-subject variables (sex-role orientation and success/failure/control practice condition) and one within-subject variable (noncompetitive and competitive sessions), as displayed in Table 1.

Insert Table 1 about here

Since all subjects worked on the puzzles both alone (noncompetitive session) and with a competitor, competition/noncom-
Table 1
Experimental Design

<table>
<thead>
<tr>
<th>WROS GROUP</th>
<th>PRACTICE CONDITION</th>
<th>Success</th>
<th>Failure</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional</td>
<td>Noncompetition</td>
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<tr>
<td></td>
<td>Competition</td>
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petition was not treated as an experimental variable in most of the analyses. One repeated-measures ANOVA was computed to examine trials or session effects, but most of the analyses examined the effects of sex-role orientation and practice condition on: performance in noncompetition, performance in competition, and changes in performance from noncompetition to competition.

The following experimental hypotheses were proposed:
(1) Since logical thinking is considered a "male" trait, nontraditional women will initially be more motivated than traditionals to excel in the noncompetitive session. This will be reflected in a significant main effect of sex-role orientation on number of puzzle attempts and time spent on the insoluble puzzle in the noncompetitive session.
(2) An interaction between sex-role orientation and practice condition is predicted for changes in performance from the noncompetitive to competitive session. Success should result in an increase in effort by nontraditional subjects and a decrease in effort by traditional subjects. Failure, on the other hand, is expected to alleviate anxiety about doing well. Inhibition of effort is expected to be less for traditionals after failure than after success. No predictions were made concerning the performance of the nontraditional group.
**Subjects**

Subjects were 48 females selected from several large psychology courses at the University of Massachusetts at Amherst during the Fall, 1974 semester, on the basis of their previously measured Wellesley Role Orientation Scale (WROS) scores. Twenty-four subjects were randomly drawn from both the high and low third of a distribution of WROS scores collected from the entire female population. Participation was solicited by telephone (see Appendix A). Subjects were not told that the experiment was associated with the questionnaire completed in class a few weeks earlier. Both the experimenter and her confederates were blinded for WROS group of all subjects until each had completed the experimental procedures.

**Questionnaire Administration**

Questionnaire packets including two projective cues, and the WROS were distributed to all females and all males present during class time in three large psychology courses (see Appendix B). Participation was voluntary and the confidentiality of responses was assured. To prevent subjects from associating this questionnaire with the subsequent experimental procedures, the experimenter was not present during the questionnaire administration. Other information on the questionnaire included sex, year in
school, and student number, as well as each student's perception of the purpose of the questionnaire. Written feedback on the questionnaire was distributed to these classes one week later (see Appendix C).

**Instruments**

Wellesley Role Orientation Scale (WROS). The WROS was designed to measure three aspects of college women's sex-role orientation: (1) traits generally regarded as "feminine" rather than "masculine", (2) role activities that are acceptable for women, and (3) career or career-oriented activities that are appropriate only for men. Reliability is reported within the limits of statistical significance (Alper, 1973). Relative agreement or disagreement with 30 statements, nine of which are unscored filler items, was recorded by the subjects on a 7-point scale (see Appendix B).

**Fear of Success.** Fear of success was measured by projective stories written to the sentence cue, "After first term finals, Joanne finds herself at the top of her medical school class" (Horner, 1968). The neutral cue was included as a filler and stories written to it were not scored.

**Questionnaire Results**

Completed questionnaires were obtained from 203 students—79 males and 123 females. Subjects' perceptions of the questionnaire materials were examined first. Only three students who specifically mentioned Horner's research or
"fear of success" were excluded from further analysis, as were five females whose WROS protocols contained more than one blank item.

Wellesley Role Orientation Scale. Relative agreement/disagreement on 21 items were scored from 1 to 7 and summed for each subject. The possible range of scores was thus 21 to 147, with high scores associated with a more traditional orientation. The male WROS protocols were not scored since several of the items were considered inappropriate for males (e.g. "If I were married and had children, I would prefer not to have a job"). In this sample of 119 college women, the range of scores was 33 to 88, with a mean of 52.71 and a standard deviation of 11.8 (see Appendix D for a graph of the distribution of scores of the entire sample). The distribution was positively skewed, with the greatest range of scores in the high group. Even the "high" group, however, can be considered relatively nontraditional since no subjects approached the ceiling score of 147.

Of those selected for experimental participation, scores of the low WROS group (n=24) ranged from 33 to 47, with a mean of 41.96, and a standard deviation of 3.91. The experimental "high" group (n=24) had a range of 57 to 88, a mean of 66.57, and a standard deviation of 8.51, reflecting the higher variability within the top range of the population distribution. Within each WROS group, subjects were
randomly assigned to one of three experimental practice treatments. There were no appreciable differences in WROS among the three practice groups, within each WROS group (see Appendix E).

**Fear of success.** One male and one female rater blindly scored the male and female "fear of success" projective stories according to Horner's (1968) simple presence/absence system. Interrater reliability, calculated by means of the phi coefficient, was found to be .81, judged a highly adequate level of reliability, p<.01. Disagreements were settled by consensus.

The incidence of fear of success was low for both males and females. As shown in Table 2, only 27 females (24.55%) and 15 males (22.06%) wrote fear of success stories. Because of this unexpectedly low occurrence of fear of success, this variable could not be used as planned to select experimental subjects. These data, nevertheless, are available for all 48 subjects, of whom 12 (25%) manifested fear of success in response to Horner's cue. Despite the low frequency of fear of success among all 203 subjects, the relationship between this variable and WROS score was examined by computing a point-biserial correlation coefficient on available female data. There was no consistent relationship
Table 2
Incidence of Fear of Success in Entire Sample

<table>
<thead>
<tr>
<th></th>
<th>Present</th>
<th>Absent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Male</td>
<td>15</td>
<td>22</td>
<td>53</td>
</tr>
<tr>
<td>Female</td>
<td>27</td>
<td>25</td>
<td>83</td>
</tr>
</tbody>
</table>
between the two, $r (119) = -.03$. In fact, fear of success stories were distributed rather evenly throughout the WROCS score distribution.

**Experimental Procedure**

There were three puzzle sessions within the experiment: (1) the noncompetitive session (NCS), (2) the practice session, and (3) the competitive session (CS). Except for the practice session the procedure was identical for all subjects. Within each WROCS group subjects were randomly assigned to one of the three practice conditions - success, failure, or control.

The task, called the "Perceptual Reasoning Test", involved solving line puzzles such as those used by Feather (1966). All the lines of the figure were to be traced without lifting the pencil from the paper or going over any segment twice. Each item of the test was printed individually on a small square of paper arranged in piles before the subject. Insolvable items, constructed to be too complex to be identified by the subject as insolvable were used. The amount of time expended and number of attempted trials on these insolvable items were the major dependent measures.

During the practice session individuals in the "success" group were given three easy solvable puzzles and those in the "failure" group were given two insolvable and one solvable puzzle. The control group received unrelated scrambled
words for the same time period. All subjects were tested individually.

In the noncompetitive session all subjects received the following instructions:

The task that you are going to do in this experiment is called the Perceptual Reasoning Test. It is a good indicator of logical thinking and general problem-solving ability, traits that have been found to relate to later vocational success. You see before you four stacks of papers with a line puzzle drawn on each sheet of paper. All the puzzles are the same within each pile, but there are different puzzles under each number. With the red pencil on the desk you are to trace over all of the lines in the figure without lifting the pencil from the paper. When you have successfully done this, you are to number the sequence in which you drew your lines, so I can see how you solved the problem. Here's an example:

```
\begin{figure}
\centering
\includegraphics[width=0.3\textwidth]{perceptual_reasoning.png}
\caption{Example of a Perceptual Reasoning Test puzzle.}
\end{figure}
```

You'll find that the four items vary in difficulty. Some are quite difficult, and not every college student is expected to be able to solve all of them. Do the best you can. When you solve a problem go on to the next one. If you don't solve it you can try again or go on to the next one at any time. Once you stop working on a puzzle, however, you can't go back to it. You can take as many tries as you wish, but you can only spend 40 seconds on each try. Each time you take a new sheet of paper, reset the timer by pressing the button to the right. The 40 second figure is an upper time limit - that is, you can take less time if you wish, but no longer on a single attempt. Any questions?

The two sets of four puzzles displayed in Figure 1 were counterbalanced in the noncompetitive and competitive sessions. The second puzzle in each set was insolvable.
Figure 1. Puzzle sets presented to subjects
Subjects were not given a time limit, but were urged to move on to problem 3 if they did not do so spontaneously after 15 minutes. When the subject finished, the experimenter checked the subject's work and said:

That was fine. Now that you have the hang of it, you're going to compete on a similar series of problems with another subject who is being given the same problems down the hall. Often ability is most accurately measured in competitive situations, and in this experiment I am interested in how competition influences problem-solving ability. You will be competing for time and accuracy. We will see who can get the most puzzles correct in the shortest amount of time.

The experimental groups received the following instructions:

Before you go to meet your opponent, you will have five minutes of additional puzzle practice. Here are three new piles of puzzles. These puzzles are like the ones you will be competing on. Since this is strictly for practice you may take as many trials as you wish, without any time restriction, and you may switch from pile to pile for the entire five minutes - or until you figure out all three puzzles. In other words, the rules for this practice session are the same as before, except that there is no time limit for each trial, and you may return to incompletely completed puzzles after working on later ones. Any questions?

The "success" and "failure" groups received the sets of puzzles displayed in Figure 1. The success group's set contained very easy puzzles, the failure group received two insolvable and one moderately difficult puzzle. The control group received these instructions:

Before you go to meet your opponent, you will have five minutes to practice a different type of problem - unscrambling words. On the following pages you will find a series of four-letter words which have had the letters scrambled around.
Your task is to unscramble the letters so that they form a word. For example, if the letters OESH were given, they could be rearranged to form the word "shoe". Some of the letters will form more than one word, but you are to write only one word on the line to the right of the letters. Any questions?

Performance during the practice session was not analyzed or considered. To check the effectiveness of the success/failure manipulation, the subjects were asked to predict their performance against the as-yet-unknown competitor. They were asked whether they expected to do better than their opponent, and to rate the certainty of their opinion along a four-point scale (1=very uncertain, 2=uncertain, 3= certain, 4= very certain).

A male experimental confederate was brought in as the opponent for the competition. As the opponents faced each other at a small table, the following instructions were read:

By now you are both experts at this task and should understand the procedure fairly well. The rules will be identical to the first session. Take only 40 seconds on each try - and reset the timer at the beginning of each try. Again, the problems are of varying difficulty, and you may leave an incompletely one at any time. Once you leave a problem though, you can't return to it. In this session you are competing for time and accuracy, so work as rapidly as you can and do your best. You will get one point for every correct solution as well as a bonus point for finishing first. You are thus trying for a maximum of five points. The session is over when one of you ends it. Sometimes it may pay to spend less time on a very difficult item, so you can get the bonus point for finishing first, but if your opponent has more items correct he or she may win the match anyway. The first to finish has an advantage, but doesn't necessarily have to be
the winner. Try your best - I may be running playoff competitions with the best puzzle solvers at the end of this study, so good luck! On your mark, get set ... begin!

At this time a partition was placed on the table between the opponents so they could not see each other. The session continued until the subject ended it, and the points were tallied. The confederate was completing the last item - and so received three points. If the subject did not go on to item three after 15 minutes, the confederate ended the session. The subjects were thanked for their participation and a post-experimental questionnaire was administered (see Appendix F). The importance of doing well, willingness to participate in another study doing similar puzzles, and task enjoyment were assessed.

The subjects were orally debriefed concerning the nature of the experiment, methods of subject selection, insolubility of the puzzles, and the identity of their opponents. All questions were answered and written feedback was available as well (see Appendix G). The importance of maintaining confidentiality about the experiment to classmates was stressed.
CHAPTER 3
Results

Experimental Performance

The performance data were analyzed both with repeated-measures ANOVA's (viewing competition/noncompetition as a within-subject variable) and with separate between-subject ANOVA's on performance in the noncompetitive session (NCS), performance in the competitive session (CS), and changes in performance from NCS to CS. Performance data included: (1) number of attempts during NCS and CS, (2) total amount of time (in seconds) spent on the insolvable puzzle during each session, and (3) work rate (time/number of attempts). The effects of Wellesley Role Orientation Scale (WROS), and practice condition were examined in both types of analysis. Self-report data included ratings of (1) importance of doing well, (2) willingness to participate in another similar study, and (3) enjoyment.

The effects of puzzle order (receiving puzzle set A or B first, see Figure 1) were analyzed and found to be insignificant for all measures. Puzzle groups were thus pooled and only pooled ANOVA results will be discussed.

The repeated-measures ANOVA analyses indicated a significant sessions effect for performance measures, with lower number of attempts, less time spent, and faster work rates during competition (see Tables 3, 4, and 5). Raw scores were converted to z-scores for each session to exa-
Table 3
Repeated-Measures Analysis of Variance of
Number of Attempts at Insolvable Puzzle

<table>
<thead>
<tr>
<th>Source of Variance</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (WROS)</td>
<td>1</td>
<td>283.59</td>
<td>2.9</td>
<td>n.s.</td>
</tr>
<tr>
<td>B (Practice Cond.)</td>
<td>2</td>
<td>16.58</td>
<td>1</td>
<td>n.s.</td>
</tr>
<tr>
<td>T (Trials)</td>
<td>1</td>
<td>472.59</td>
<td>18.79</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>AB</td>
<td>2</td>
<td>28.34</td>
<td>1</td>
<td>n.s.</td>
</tr>
<tr>
<td>AT</td>
<td>1</td>
<td>23.01</td>
<td>1</td>
<td>n.s.</td>
</tr>
<tr>
<td>BT</td>
<td>2</td>
<td>33.84</td>
<td>1.35</td>
<td>n.s.</td>
</tr>
<tr>
<td>S (AB)</td>
<td>42</td>
<td>97.48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ABT</td>
<td>2</td>
<td>119.45</td>
<td>4.75</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>ST (AB)</td>
<td>42</td>
<td>25.15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4
Repeated-Measures Analysis of Variance of
Time Spent at the Insolvable Puzzle

<table>
<thead>
<tr>
<th>Source of Variance</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (WROS)</td>
<td>1</td>
<td>25285.04</td>
<td>1</td>
<td>n.s.</td>
</tr>
<tr>
<td>B (Practice Cond.)</td>
<td>2</td>
<td>20517.79</td>
<td>1</td>
<td>n.s.</td>
</tr>
<tr>
<td>T (Trials)</td>
<td>1</td>
<td>1596504.17</td>
<td>45.37</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>AB</td>
<td>2</td>
<td>90004.04</td>
<td>1.51</td>
<td>n.s.</td>
</tr>
<tr>
<td>AT</td>
<td>1</td>
<td>4959.38</td>
<td>1</td>
<td>n.s.</td>
</tr>
<tr>
<td>BT</td>
<td>2</td>
<td>1089.29</td>
<td>1</td>
<td>n.s.</td>
</tr>
<tr>
<td>S (AB)</td>
<td>42</td>
<td>59567.51</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ABT</td>
<td>2</td>
<td>188741.38</td>
<td>5.36</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>ST (AB)</td>
<td>42</td>
<td>35.86.29</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 5
Repeated-Measures Analysis of Variance of Work Rate

<table>
<thead>
<tr>
<th>Source of Variance</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (WROS)</td>
<td>1</td>
<td>459.38</td>
<td>1.84</td>
<td>n.s.</td>
</tr>
<tr>
<td>B (Practice Cond.)</td>
<td>2</td>
<td>1.76</td>
<td>1</td>
<td>n.s.</td>
</tr>
<tr>
<td>T (Trials)</td>
<td>1</td>
<td>1488.38</td>
<td>14.03</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>AB</td>
<td>2</td>
<td>122.28</td>
<td>1</td>
<td>n.s.</td>
</tr>
<tr>
<td>AT</td>
<td>1</td>
<td>4.17</td>
<td>1</td>
<td>n.s.</td>
</tr>
<tr>
<td>BT</td>
<td>2</td>
<td>207.84</td>
<td>1.96</td>
<td>n.s.</td>
</tr>
<tr>
<td>S (AB)</td>
<td>42</td>
<td>249.31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ABT</td>
<td>2</td>
<td>117.95</td>
<td>1.11</td>
<td>n.s.</td>
</tr>
<tr>
<td>ST (AB)</td>
<td>42</td>
<td>106.12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
mine relative changes within WROS and practice groups over and above the sessions effect. Only z-score analyses will be discussed.

**Performance during the noncompetitive session (NCS).**

No main effects appeared for number of attempts, time spent, or work rate, and no interaction effects were found for number of attempts or work rate. A significant interaction between WROS and practice condition occurred for time spent, $F(2,42) = 3.58, p<.05$. Tests of significance between the z-score means, shown in Table 6, indicate that

Insert Table 6 about here

within the success condition the traditional WROS group spent significantly more time on the insolvable puzzle than the nontraditional WROS group, $t(14) = -2.34, p<.05$.

This interaction is difficult to interpret since the experimental practice manipulation had not yet been introduced in the experimental session. Later results must be evaluated, however, in light of this initial interaction.

The hypothesis that nontraditionals would exhibit more initial task persistence in number of attempts, time spent, and work rate in NCS was not supported.

**Performance during the competitive session (CS).** Only one main effect even approached significance in CS. Traditional WROS subjects tended to make more puzzle attempts
<table>
<thead>
<tr>
<th>WROS Group</th>
<th>Practice Condition</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Success</td>
<td>Control</td>
<td>Failure</td>
</tr>
<tr>
<td>Nontraditional</td>
<td>NCS</td>
<td>-.56</td>
<td>.19</td>
<td>.27</td>
</tr>
<tr>
<td>Traditional</td>
<td>CS</td>
<td>.57</td>
<td>-.38</td>
<td>-.08</td>
</tr>
<tr>
<td>Nontraditional</td>
<td>NCS</td>
<td>-.00</td>
<td>-.12</td>
<td>-.29</td>
</tr>
<tr>
<td>Traditional</td>
<td>CS</td>
<td>-.14</td>
<td>-.10</td>
<td>.67</td>
</tr>
</tbody>
</table>
than nontraditional subjects \( M = 7.75, F(1, 42) = 3.48, .05 < p < .10 \). There were no main effects for time spent or work rate. Interaction effects did not occur for any of the three performance measures.

**Change in-performance scores from NCS to CS.** There were no significant main effects in changes in number of attempts, time spent, or work rates. Significant interactions between WROCS and practice condition occurred for changes in number of attempts, \( F(2, 42) = 4.99, p < .05 \), and changes in time spent, \( F(2, 42) = 5.02, p < .05 \). When practice conditions are ordered success-control-failure, change scores increase among the nontraditionals, but decrease among the traditionals.

Tests of significance between \( z \)-score means for change in number of attempts, as shown in Table 7, indicated that

---

Insert Table 7 about here

---

the traditional success group decreased attempts significantly more than either the traditional failure, \( t(14) = 2.43, p < .05 \), or traditional control groups, \( t(14) = 3.88, p < .05 \). The latter two groups did not differ from each other. The change in attempts scores of the three nontraditional practice groups, as tested by \( t \)-ratios did not differ. The nontraditional and traditional groups differed in the failure, \( t(14) = -2.15, p < .05 \), and success, \( t(14) = 2.62, \)
Table 7
Mean Change in Number of Attempts
Computed from z-Scores
From the Noncompetitive to Competitive Session

<table>
<thead>
<tr>
<th>WROS Group</th>
<th>Practice Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Success</td>
</tr>
<tr>
<td>Nontraditional</td>
<td>.18</td>
</tr>
<tr>
<td>Traditional</td>
<td>-.75</td>
</tr>
</tbody>
</table>

Note: Noncompetitive session z-scores were subtracted from competitive session z-scores.
\( p < .05 \), conditions, as illustrated in Figure 2.  

Insert Figure 2 about here

In the failure condition nontraditionals relatively decreased and traditionals increased in number of attempts, whereas in the success condition, nontraditionals increased and traditionals decreased attempts.

The same pattern of results occurred for the change in time spent variable, as shown in Table 8 and Figure 3.  

Insert Table 8 and Figure 3 about here

T-tests between z-score means reflected no practice group differences among the nontraditional subjects, or between the traditional failure and control groups. The traditional success group, however, decreased in time spent significantly more than the traditional failure, \( t (14) = 2.85, p < .05 \), group, and tended to decrease more than the control group, \( t (14) = 1.88, p < .10 \). Differences between the traditionals and nontraditionals in the failure, \( t (14) = 2.20, p < .05 \), and success conditions, \( t (14) = 1.90, p < .10 \), reflected the same pattern as did the change in attempts scores. Nontraditionals relatively decreased time

1. Raw data rather than z-scores are plotted in Figures 2 and 3 to better illustrate the magnitude of the differences.  
2. This is not surprising since the change in number of attempts and the change in time spent measure were highly positively correlated .83, \( p < .01 \).
FIGURE 2. Mean Number of Attempts in Non-competitive and Competitive Sessions.
Table 8
Mean Change in Time Spent
Computed from z-Scores
From the Noncompetitive to Competitive Session

<table>
<thead>
<tr>
<th>WROS Group</th>
<th>Practice Condition</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Success</td>
<td>Control</td>
<td>Failure</td>
<td></td>
</tr>
<tr>
<td>Nontraditional</td>
<td>.55</td>
<td>-.32</td>
<td>-.56</td>
<td></td>
</tr>
<tr>
<td>Traditional</td>
<td>-.71</td>
<td>.28</td>
<td>.75</td>
<td></td>
</tr>
</tbody>
</table>

Note. Noncompetitive session z-scores were subtracted from competitive session z-scores.
FIGURE 3. Mean Time Spent in Noncompetitive and Competitive Sessions
spent in the failure condition and relatively increased time spent in the success condition. For traditionals, scores were in the opposite direction.

The change data, however, must be evaluated in light of the initial interaction between WROS and practice condition that occurred for time spent in NCS. Although only one significant F-ratio occurred, the expectation that baseline scores would be randomly distributed among experimental practice groups was not supported. Analyses of covariance were thus computed for number of attempts and time spent during competition, controlling for NCS performance. When adjusted for performance during NCS, neither WROS nor practice condition significantly affected number of attempts or time spent during CS. However, their interaction was marginally significant at the .07 level for number of attempts during CS, as shown in Table 9. The adjusted group means

\[\text{Insert Tables 9 and 10 about here}\]

in Table 10 indicate that traditionals made far fewer attempts in the success condition than in either the control or failure treatments. This finding supports the hypothesis that traditionals will inhibit efforts after success. No

3. Although there were no significant differences in number of attempts during NCS, analysis of covariance was employed on this variable as well, because of its high correlation, \(r = .81, p < .01\), with time spent in NCS.
Table 9

Analysis of Covariance of Number of Attempts during Competition Controlling for NCS Performance

<table>
<thead>
<tr>
<th>Source of Variance</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within cells</td>
<td>41</td>
<td>44.71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>1</td>
<td>992.20</td>
<td>22.19</td>
<td>.001</td>
</tr>
<tr>
<td>A (WROS)</td>
<td>1</td>
<td>91.94</td>
<td>2.06</td>
<td>.16</td>
</tr>
<tr>
<td>B (Practice Cond.)</td>
<td>2</td>
<td>57.45</td>
<td>1.29</td>
<td>.29</td>
</tr>
<tr>
<td>AB</td>
<td>2</td>
<td>123.93</td>
<td>2.77</td>
<td>.07</td>
</tr>
</tbody>
</table>
Table 10
Mean Number of Attempts in Competition
Adjusted for Initial NCS Performance

<table>
<thead>
<tr>
<th>WROS Group</th>
<th>Practice Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Success</td>
</tr>
<tr>
<td>Nontraditional</td>
<td>9.63</td>
</tr>
<tr>
<td>Traditional</td>
<td>5.95</td>
</tr>
</tbody>
</table>
such pattern occurred for the nontraditional group.

Number of attempts during NCS accounted for a significant amount of the variance ($p<.001$) during CS, as shown in Table 9. Time spent during NCS was a marginally significant ($p<.07$) factor in time spent during CS, as shown in Table 11. However, there were no significant main or inter-

Insert Table 11 about here

action effects for time spent in CS when initial differences were controlled for.

Summary of performance data. The absence of significant main effects on performance in NCS fails to confirm the first hypothesis that nontraditionals would be initially more motivated and thus more persistent than traditionals. During CS there was a marginal tendency for traditional subjects to make more puzzle attempts than nontraditionals. When initial NCS performance differences were controlled, a trend remained for traditionals in the success condition to make fewer puzzle attempts during CS than traditionals in either the failure or control groups. This finding supports the second hypothesis predicting such an interaction effect in change scores. No significant differences were found among the nontraditional practice groups in number of attempts during CS. Except for a sessions effect, no differences in time spent, or work rate appeared among the groups.
Table 11
Analysis of Covariance of Time Spent during Competition
Controlling for NCS Performance

<table>
<thead>
<tr>
<th>Source of Variance</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within cells</td>
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<td>26203.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>1</td>
<td>93221.81</td>
<td>3.56</td>
<td>.07</td>
</tr>
<tr>
<td>A (WROS)</td>
<td>1</td>
<td>22717.99</td>
<td>.87</td>
<td>.36</td>
</tr>
<tr>
<td>B (Practice Cond.)</td>
<td>2</td>
<td>8706.31</td>
<td>.33</td>
<td>.72</td>
</tr>
<tr>
<td>AB</td>
<td>2</td>
<td>59774.90</td>
<td>2.28</td>
<td>.12</td>
</tr>
</tbody>
</table>
Self-Report Measures

Self-reported importance of doing well, willingness to participate in another similar experiment, and enjoyment of experimental participation were rated on a one to five scale, with low numbers indicative of high importance, willingness, and enjoyment, (see Appendix F). There were no significant differences among the WROS or practice groups in any of the measures. In general, subjects: (1) were somewhat neutral on the importance of doing well (M = 2.73), (2) were willing to participate in another similar study (M = 1.85), and (3) enjoyed participating in the study (M = 2.0).

Effectiveness of the Experimental Practice Manipulation

As a check on the effectiveness of the experimental practice manipulation subjects were asked at the end of the practice session to predict their performance against the as-yet-unknown competitor. They stated whether they expected to win or lose, and rated the certainty of their opinion along a four point scale (1= very uncertain to 4= very certain). A chi-square was computed to see whether the success and failure treatments respectively increased and decreased predictions of winning compared to control group predictions. The data are presented in Table 12.

Insert Table 12 about here

The chi-square indicated no differences among the practice
Table 12

Percentages of Win/Lose Predictions Among the Experimental Practice Groups

<table>
<thead>
<tr>
<th></th>
<th>Success</th>
<th>Control</th>
<th>Failure</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Win</td>
<td>25 (4)</td>
<td>38 (6)</td>
<td>25 (4)</td>
<td>29</td>
</tr>
<tr>
<td>Lose</td>
<td>75 (12)</td>
<td>62 (10)</td>
<td>75 (12)</td>
<td>71</td>
</tr>
</tbody>
</table>

Numbers in parentheses indicate the number in each group making the prediction.
groups in expectancy of success, raising questions about the effectiveness of this manipulation. The majority of subjects (70.8%) expected to lose, regardless of success or failure during the practice session. There was a marginally significant interaction between sex-role orientation and practice condition, $F(2, 42) = 2.88, p < .10$. Nontraditionals tended to be less self-confident in the control group than in either the failure or success conditions, as shown in Table 13, $t(14) = -2.04, p < .10$. Experimental practice group means among the traditionals did not differ.

There were no differences in certainty of prediction among the groups.

**Intercorrelations Between the Dependent Variables**

A central assumption of this study was that motivation is positively related to task persistence. To test this assumption, and to facilitate data interpretation, correlations were computed between the performance and self-report measures. Correlation matrices were computed for the 15 dependent variables across the entire sample, and also separately for the traditional and nontraditional WROS groups. Since there were no specific hypotheses concerning these relationships, two-tailed tests of significance were employed.
Table 13
Mean Win/Lose Prediction Scores

<table>
<thead>
<tr>
<th>WROS Group</th>
<th>Practice Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Success</td>
</tr>
<tr>
<td>Nontraditional</td>
<td>-.25</td>
</tr>
<tr>
<td>Traditional</td>
<td>-.75</td>
</tr>
</tbody>
</table>

Note. Predictions of winning were scored +1, and predictions of losing -1. Group means of -1 indicate that every subject predicted a loss, group means of 0, that win/lose predictions were equally frequent, and so on.
Correlations for the entire sample. All three self-report measures (importance, willingness, and enjoyment) were significantly and positively correlated, $p < .05$, (see Appendix H). High importance ratings were associated with greater number of attempts in both NCS, $r = -.31$, $p < .05$, and CS, $r = -.32$, $p < .05$, and with faster work rates in NCS, $r = .43$, $p < .01$. This pattern of correlation generally supports the initial assumption that motivation would be related to task persistence. Greater willingness was associated with faster work rates in NCS, $r = .48$, $p < .01$, and a slowing of work rate from NCS to CS, $r = -.36$, $p < .02$. Enjoyment ratings were not significantly related to any of the behavioral measures.

A comparison of patterns of traditionals and nontraditionals. The separate correlation matrices of the traditionals and nontraditionals did not differ greatly, but within each group, different correlations reached significance (see Appendices I and J).

(a) Importance ratings - For nontraditionals, high importance ratings were associated with a decrease in attempts from NCS to CS, $r = .43$, $p < .05$. For traditionals, high importance ratings were associated with greater number of attempts in CS, $r = -.41$, $p < .05$, and with slower work rates in NCS, $r = .53$, $p < .01$.

(b) Willingness ratings - For both groups faster work rates
in NCS were associated with greater willingness, p<.05. In addition, greater willingness was associated with a slowing of work rate from NCS to CS for the nontraditionals, \( r = -0.44, p<0.05 \), and greater number of attempts in NCS for the traditionals, \( r = -0.42, p<0.05 \).

(c) Enjoyment ratings - Enjoyment for the nontraditionals was negatively related to number of attempts in CS, \( r = 0.45, p<0.05 \), and positively related to a slowing of work rate from NCS to CS, \( r = -0.41, p<0.05 \). No significant correlations emerged in the traditional group.
CHAPTER 4
Discussion

The findings of the experiment can be summarized as follows: (1) all groups decreased in attempts, time spent, and work rate from NCS to CS, (2) an interaction between WROS and practice condition occurred for time spent in NCS, (3) traditionalists tended ($p<.10$) to make more puzzle attempts than nontraditionalists in CS, and (4) significant interactions between WROS and experimental conditions occurred for changes in attempts and changes in time spent from NCS to CS. These significant findings, as well as the absence of other significant group differences, must be examined in light of the initial goals, hypotheses, and assumptions of the experiment.

A prime goal of the study was to examine achievement motivation alone and in competition, of women differing in sex-role orientation. Nontraditionalists were expected to be initially more persistent in an intellectual task, and traditionalists were expected to inhibit efforts in competition more after success than failure. A major assumption was that behavioral measures of task persistence would be a reflection of the strength of the aroused motive to achieve. The correlational data will be used to evaluate this assumption, although no causal statements are possible. If, for example, number of attempts is positively related to importance ratings, it is impossible to determine whether a high
number of attempts occurred because of initially great importance of doing well, or whether high importance ratings were given to justify a great amount of effort expended.

The decrease in persistence from NCS to CS for the sample as a whole may reflect something besides a decrease in motivation during competition. For one thing, time constraints were present during CS that were not present in NCS. In order to obtain initial baseline measures, no time pressures at all were instituted in NCS. Subjects were encouraged to go on to a new puzzle only if they had already persisted for 15 minutes. During the competition, however, a time restraint was introduced to give some closure to the competitive session, and to provide some criteria for "winning”. Subjects received a point for every correctly solved puzzle, as well as a bonus point for finishing the series first. As a result, the meaning of persistence may be more ambiguous in CS than in NCS. Extreme persistence could have been motivated by a desire to lose the match by stalling, or by a high motivation to persist and gain an extra point for solving the puzzle. Similarly, short persistence might have been motivated by a desire to finish first and gain a point. In NCS, persistence can be straightforwardly interpreted as a desire to master the problem.

Trials effects may also have been operative. By the second session all subjects had gained experience with the
task and had been frustrated by an insolvable puzzle. They had learned that persistence doesn't always lead to successful puzzle solution, and as a result may have been less willing to persist as long in CS.

Looking to the correlational data to shed some light on data interpretation, we find a high positive correlation between number of attempts in NCS and CS ($r (46) = .53, p < .01$). Number of attempts in both sessions were positively related to importance ratings as well, supporting the assumption that degree of persistence reflected degree of motivation in both sessions. The decrease in absolute number of attempts and time spent might be interpreted as a strategic response to new task demands rather than a decrease in motivation. Relative persistence within each session still seems to be meaningfully related to motivation, as reflected by self-rated importance. In fact, the increase in rate of response during competition suggests that motivation actually increased during competition for the sample as a whole.

There were no initial NCS sex-role differences in any of the behavioral measures. Nontraditionals did not expend any more effort to demonstrate "logical thinking and problem solving". The first hypothesis was thus not confirmed.

The significant interaction between WROS and experimental condition, for the time spent measure in NCS, is
difficult to evaluate, since the experimental manipulation had not yet been introduced. The background data of the subjects in the different experimental groups were examined for systematic differences that might explain this initial difference. No age or class differences appeared, and each group consisted of a variety of departmental majors. The sample was predominately freshwomen and sophomores, with a mean age of 18.7. No differences in post-graduate plans were apparent. Forty-eight percent of the traditionals and 54 percent of the nontraditionals had no definite post-graduate plans. Experimenter bias is unlikely since subjects were blindly run regarding sex-role orientation. Even if experimenter bias operated on experimental practice groups, the interaction effect is still unaccounted for.

Turning to performance during competition, the trend \( p < .10 \) of traditionals making more puzzle attempts than nontraditionals might be interpreted as higher motivation for traditionals than nontraditionals in competition. From the correlational data, number of attempts during competition was positively related to high importance ratings for the traditionals, and for the sample as a whole. However, when the correlational data of the nontraditionals are examined, high importance ratings were associated with decreases in number of attempts from NCS to CS. It seems
plausible to suggest that the WROS differences in number of attempts in competition may reflect different behavioral strategies for approaching the task rather than motivational differences in desire to do well. Motivational differences would be expected to also emerge in differences in importance ratings and work rate, yet these were comparable for the two groups.

The most striking result was the drop in number of attempts in competition for the traditional group after success (see Figure 2 and Table 10). Interpretation of this finding is complicated, however, by uncertainty concerning the effectiveness of the experimental manipulation.

Experimental treatment had no significant effect on win/lose predictions. As shown in Table 12, most subjects (71%) expected to lose regardless of success or failure during the practice session. Aside from motivational effects of encouragement or discouragement, the practice session might be viewed as providing the subject with information about her skill on the task. Solving a series of easy puzzles during practice may have taught the subject that these puzzles don't take much time. If a problem can't be solved quickly, it's best to leave it, in order to get the bonus point for finishing first. On the other hand, a subject who had practiced on impossible problems may have learned that the problems are difficult and require more
time - and may have persisted longer. Regardless of motivation, the experimental manipulation may have taught different strategies of approaching the task, based on assessment of difficulty level.

These considerations provide an alternative to the conclusion that the traditional group experienced "ambivalence" after success, and thus decreased effort during competition. If, however, informational value of task difficulty was what subjects were getting out of the practice session, it is unclear why only the traditional group decreased effort after doing an easy set of problems. Theories of sex-role conflict in competition with a male, however, would predict such a finding. To more conclusively support an interpretation of inhibition of effort due to ambivalence, several methodological changes should be instituted in future work. A less ambiguous task must be used in which one route to success is obvious and available to all subjects. Success and failure must be manipulated separately from task difficulty, since the latter has informational as well as motivational effects. This could be accomplished by directly telling subjects they had done better or worse than their opponent.

Wellesley Role Orientation Scale

It is difficult to compare the WROS distribution of this sample with those reported by Alper (1973, 1974)
because an expanded 7-point scoring system was adopted from the original 2-point scale. As noted previously, the most "traditional" score in this sample (88) was still far below the possible ceiling of 147. Alper (1974) claims that the WROS has validity within restricted ranges of scores, but no significant main effects appeared for WROS in the current study for behavioral or self-report data. Perhaps college women exposed to a liberal university environment are too homogeneous in overt values to get meaningful questionnaire score differences.

Fear of Success

In the current sample the incidence of fear of success elicited by the Horner cue was of equally low magnitude (about 25%) for both males and females. Many of the stories received were positive in tone and reflected the general notion that hard work leads to success and satisfaction. When the experimental data of the 12 available fear of success subjects were examined with unequal n \( t \)-ratios, no experimental differences emerged between these and the no-fear-of-success subjects. The lack of significant fear of success results in this and other studies (Tresemer, 1974) necessitates a methodological and conceptual reevaluation of this measure. In doing so, it is useful to distinguish between the concept of psychological ambivalence or anxiety in achievement situations and the particular way Horner has proposed to measure and study it.
One interpretation of these findings is that success is no longer threatening to women. Since Horner's original work there is more encouragement of female advancement in the professions. The percent of doctorates earned by women increased markedly in 1972 and 1973, as has female enrollment in medical and law schools. Perhaps female achievement is currently seen as more acceptable - or at least "unfashionable" to deny at the verbal level.

On the other hand, criticism can be leveled at the particular methodology developed by Horner to measure ambivalence. The situation of being number one in a medical school class is only one rather specific type of success. Negative stories may reflect a rejection of high status "establishment" careers, as well as the realities of professional commitment (e.g. sacrifices, long hours, little time for other activities). Standards of success may be changing so that internal satisfaction is valued as much as public status - especially if the latter is gained at the cost of personal needs, values, and desires. The projective technique may be too simplistic to get at the subtle factors that create anxiety for women in everyday achievement situations.

Despite the low frequency of fear of success imagery, it was of interest to note the independence of sex-role orientation and fear of success. This lends some support
to Horner's conception of fear of success as a latent personality trait that is independent of sex-role standards acquired in adulthood.

Research and Understanding of Female Achievement

Female occupational achievement is a particularly difficult phenomenon to study, because of changing sex-role standards, changing definitions and standards of success, and changing economic conditions which may limit the job opportunities that are available. The psychological analysis of a phenomenon (especially one of current social controversy) may change the nature of the phenomenon (Gergen, 1974). This may be especially true of sex-role research. Women who become aware of their socialization to be incompetent, passive, and underachieving, may consciously act in the reverse way - validating and disconfirming the psychological theory at the same time.

The current study found some evidence for traditional female ambivalence in competition with males after success, but the trend was not reflected in all of the measures taken. In post-experimental interviews very few subjects admitted a fear of competing with men. In fact many were emphatic in denying that achievement was inappropriate for women. They said that careers and achievement were important personal life goals. Others stated that they disliked competition, per se, regardless of the sex of opponent. Even
the traditional groups' decrease in persistence after "success" can be interpreted as an adaptive response to a frustrating situation, rather than inhibition of effort because success is threatening.

Maccoby and Jacklin (1974) have reviewed a large number of studies that fail to find commonly accepted sex differences. They argue that many of our assumptions about male-female behavior have little empirical support. Although the current study did not compare males and females, a major assumption was that female achievement follows different patterns than male achievement. In the current study, only women were studied in order to better explore variables that were felt to affect female achievement. However, failure to reject a null hypothesis can always be interpreted in two ways: (1) There are actually no "true" differences between the groups; or (2) The experimental procedure used was not sensitive enough to bring out differences that do exist.

Regarding the second possibility, there are several critiques of laboratory research that may explain its failure to reveal achievement ambivalence in women. The consequences of success at a laboratory task are of no long-lasting import, the competitors are usually strangers, the task simplistic and unrelated to the complex series of behaviors that must be sustained over long periods of time
in order to "achieve" in the professional work world. It seems paradoxical that women still swell the lower ranks of status hierarchies, are concentrated in only a handful of work fields, earn lower wages - yet are similar to males in ability and motivation, as reflected in psychological research (Maccoby & Jacklin, 1974). Though discrimination is a definite contributor to the problem, it alone cannot account for the entire situation. In this writer's opinion, it is necessary to adopt naturalistic research designs and more sophisticated psychological measures in order to study the complex and subtle ways in which women deal with achievement situations - from the initial formation of aspirations to the persistence and self-confidence necessary for ultimate success.
APPENDIX A

Subject Phone Solicitation

Hello. Is ____________ there? My name is Judy Levy and I'm a graduate student in the Psychology Department. Your name was part of a random sample of students taking psychology courses from which I am drawing the subjects for my masters thesis. Are you in a class in which you can use experimental credits? Good. Let me describe the experiment and then you can tell me whether you'd like to participate. You can get one experimental credit for your participation. The experiment will involve solving challenging puzzles and will take about an hour. Do you think you'd be interested in participating?
APPENDIX B

Questionnaire Form

PLEASE READ AS SOON AS YOU ENTER CLASS

Items in this packet are part of a research project examining attitudes and values of college students. They are being distributed to several large classes at the university. Participation takes about 10 minutes and is, of course, voluntary. Your participation would be greatly appreciated.

The first part involves writing imaginative stories to two described situations. In the second part you will record your relative agreement or disagreement with thirty statements. There are no right or wrong answers and you will not be graded in any way. All responses are confidential. Your student number, sex, and semester in school should be recorded below to facilitate a possible follow-up questionnaire.

Please work quickly, answer all parts, and pass your packets to the end of the row on your right when you are finished.

Thank you for your cooperation.

Student Number ______________________
M _____  F ________
Number of semesters in school (class) __________________
You are going to see a verbal lead or cue and your task is to tell a story that is suggested to you by the cue. Try to imagine what is going on. Then tell what the situation is, what led up to the situation, what the people are thinking, and feeling and what they will do. In other words, write as complete a story as you can - a story with plot and characters.

Take about 20 seconds to read the verbal cue and about 3 minutes to write your story about it. Write your first impressions and work rapidly. There are no right or wrong stories or kinds of stories, so you may feel free to write whatever story is suggested to you when you look at the cue. Spelling, punctuation, and grammar are not important. What is important is to write fully and as quickly as possible the story that comes into your mind, as you imagine what is going on in the cue.
ROBERT IS THINKING OF WHAT TO DO ON A SUNNY AFTERNOON
What is happening? Who are the persons?

What has led up to this situation?

What is being thought? What is wanted?

What will happen? What will be done?
AFTER FIRST TERM FINALS JOANNE FINDS HERSELF AT THE TOP
OF HER MEDICAL SCHOOL CLASS
What is happening? Who are the persons?

What has led up to this situation?

What is being thought? What is wanted?

What will happen? What will be done?
The following questionnaire is designed to sample opinions and attitudes. There are no right or wrong answers. You may find yourself agreeing strongly with some of the statements, disagreeing just as strongly with others, and feeling less certain about others. Regardless of how you feel, make sure you mark every statement in the left margin. Write in +3, +2, +1 or -3, -2, -1 according to how much you agree or disagree with it.

+3 strongly agree
+2 moderately agree
+1 slightly agree
-1 slightly disagree
-2 moderately disagree
-3 strongly disagree

Respond to each statement in terms of the pronoun or adjective appropriate for your sex (e.g. masculine/feminine, husband/wife). Although some statements may seem more applicable to the opposite sex, answer them according to your own perspective.

(X) There is hardly anything lower than a person who does not feel a great love, gratitude, and respect for his/her parents.

______ If I were married and had children, I would prefer not to have a job.

______ I believe that aggressiveness and drive are more valuable personality attributes for men than for women.

(X) I think that college students, in general, tend to be impolite.

______ Since women are less apt to complete their training, preference should be given to men in admission to medical school.
I object to jobs where I have to wear uniforms which make me appear less feminine/masculine.

It seems to me that girls think about marriage more frequently than boys do.

When given a present, I prefer it to be something frivolous rather than something practical.

Just because I have chosen a career rather than marriage does not mean that I am less feminine/masculine.

My husband/wife and I should discuss all problems but the ultimate decisions should rest with him/her.

I believe that men have greater ability than women to apply the principles of math and science.

A marriage should not be made unless the couple plans to have children.

As an undergraduate, I should pick a major because I am interested in the subject, not because I am preparing for a specific career.

To achieve a happy marriage, I think it is necessary to subordinate my interests to those of my husband/wife.

A man who doesn't provide well for his family ought to consider himself pretty much a failure as husband and father.

I feel that able women should give serious thought to a career instead of marriage.

I see no reason why a woman should not be elected President of the United States.

I don't think men should have to change diapers or take care of infants.

I feel it is just as important for a girl to receive a higher education as it is for a boy.

It is important to teach the child as early as possible the manners and morals of his/her society.
It seems to me that girls desiring to enter such professions as law or engineering are somewhat masculine.

I think that a working mother has a greater chance for achieving happiness than an unmarried career woman.

I think women don't have what it takes to be business executives.

Given a choice, I would rather knit than build something with my hands.

I would find it more difficult to have confidence in a female doctor than in a male one.

People who are sentimental will never work hard to overcome obstacles and improve themselves.

Most of my energies should be put into a career that will contribute something to society as a whole.

I like a date to notice what I am wearing.

If I were to take a teaching job, I would rather teach science than English literature.

I believe that all colleges should abolish grades.

(NOTE: the marked items are the filler items.)
What do you think will be done with the information just collected?

Be sure your student number, sex, and number of semesters in school has been filled in on the first page.

Please pass this to your right when finished.
Thank you again for your participation.
APPENDIX C

Questionnaire Feedback

The Questionnaire that you filled out in class consisted of two parts, several "projective" sentence cues, and an attitude survey called the Wellesley Role Orientation Scale (WROS). Projective stories are scored in terms of the themes that appear within them, and they are supposed to be indicative of one's motives and personality. Often projective techniques are used to measure achievement motivation. One of the sentences you received was a neutral one, and will not be scored. The second one, "After first term finals Joanne finds herself at the top of her medical school class", was found by Matina Horner to elicit a "motive to avoid success". A large number of college females, but only a few males wrote negative stories to the above sentence. Horner argued that success is both positive and negative for women because although it is culturally valued, it is perceived as unfeminine. Males have little ambivalence about success because masculinity is compatible with success, and often is defined in terms of it.

Many recent investigators, however, have been unable to replicate Horner's findings. Some studies have found increases in male fear of success; others report that changing cultural standards have made success more acceptable
for college women. Your stories will be scored for fear of success, and sex differences in the frequency of such themes will be noted. The last page (in which you wrote what you thought would be done with the information) will be examined to see how obvious the sentence cue was to you, and how many of you were previously familiar with the research.

The Wellesley Role Orientation Scale has been used to measure the sex-role preferences of college women, in terms of the traits generally regarded as "feminine" rather than "masculine", the role activities considered acceptable for women, and the career activities considered appropriate only for men. It has been slightly adapted for use with male subjects as well. There have been shifts in sex-role preferences of late, with fewer and fewer traditional "feminine" alternatives selected. The group mean and score distribution of your questionnaire responses will be examined. The fear of success scores will also be compared to the WROS scores to determine the relationship between the two measures.

Those who are interested in the issues of fear of success and achievement motivation in women are referred to the following articles:


APPENDIX D: WROS Distribution for the Entire Female Population (n=119)
APPENDIX E

Description of Experimental Practice Groups

I FEAR OF SUCCESS

<table>
<thead>
<tr>
<th></th>
<th>Success</th>
<th>Failure</th>
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<th>Total</th>
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<tbody>
<tr>
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<td>12</td>
</tr>
<tr>
<td>Absent</td>
<td>11</td>
<td>11</td>
<td>13</td>
<td>35</td>
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</table>

II WELLESLEY ROLE ORIENTATION SCALE

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<th>Control</th>
<th>Total</th>
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<tr>
<td><strong>HIGHS</strong></td>
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<tr>
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</tr>
<tr>
<td>s.d.</td>
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<td>9.06</td>
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<td>8.51</td>
</tr>
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<td><strong>LOWS</strong></td>
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<td>Range</td>
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<td>13</td>
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<tr>
<td><strong>TOTAL</strong></td>
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</tr>
<tr>
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<tr>
<td>Range</td>
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<td>52</td>
<td>48</td>
<td>54</td>
</tr>
</tbody>
</table>
APPENDIX F

Post-experimental Questionnaire

Name ____________________________
Age ______ Major ___________________
Year in school _____________________

1) How important was it for you to do well on this test?

1 2 3 4 5
Very Important Neutral Unimportant Very Unimportant

2) How willing are you to participate in another study doing a similar puzzles task?

1 2 3 4 5
Very Willing Neutral Unwilling Very Unwilling

3) How much did you enjoy participating in this experiment?

1 2 3 4 5
Enjoyed Enjoyed Neutral Didn't Enjoy didn't enjoy at all
alot

Have you formulated any post-graduate plans as yet?

What are they?
APPENDIX G

Post-experimental Feedback

This experiment investigated the effects of sex-role standards, fear of success, and prior success and failure on achievement motivation in college women. Subjects were selected on the basis of their responses to a previously administered sex-role questionnaire, and projective "fear of success" cue. Early research on achievement motivation used primarily male subjects. Female achievement behavior did not conform to the theory developed from the males. It is only in the past six years that increased attention has been paid to the dynamics of female achievement behavior. Achievement and competition have been viewed as a source of conflict for women. Success over males may be considered to be incompatible with femininity.

Achievement motivation was measured by the number of attempts at an insoluble puzzle both alone and in competition with a male experimental confederate. Before meeting the opponent, one experimental group received easy practice problems, another group received difficult-to-impossible practice problems, and a third group received unrelated practice problems. It is hypothesized that those subjects who wrote fear of success stories, and who expressed more traditional sex-role views will be most likely to inhibit
their problem-solving efforts when competing with a male. Subjects who wrote stories without fear of success themes, or who expressed more nontraditional sex-role views are not expected to inhibit their efforts during competition.

The effects of success and failure during the practice session will also be examined. Those who are ambivalent about competition and achievement are expected to inhibit achievement efforts more after success than failure, because success is more threatening. Those who are unambivalent about competition and achievement are expected to increase achievement efforts after success, because they will have a greater expectation of succeeding.

FOR ADDITIONAL INFORMATION AND OPPORTUNITY TO DISCUSS THIS STUDY SEE JUDY LEVY IN TOBIN 413.
APPENDIX H
CORRELATION MATRIX FOR THE ENTIRE SAMPLE

<table>
<thead>
<tr>
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<th>R1</th>
<th>A2</th>
<th>T2</th>
<th>R2</th>
<th>AA</th>
<th>TT</th>
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</thead>
<tbody>
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<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>NCS TIME (T1)</td>
<td>.81**</td>
<td></td>
<td></td>
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(2-tailed, n=24)
APPENDIX J
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