PROBLEM-SOLVING PERFORMANCE OF MALES AND FEMALES AS A FUNCTION OF INSTRUCTIONS AND GROUP COMPOSITION

Charlene Berger

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ABSTRACT

Charlene Berger

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This study was designed to examine conditions under which women's problem-solving performance might be enhanced. The main hypothesis of this study was based on earlier research which has shown the usual finding of better problem-solving performance by males. It was hypothesized that males would problem solve better than females and that women's problem-solving performance would be enhanced by their presence in a mixed-sex group and by noncompetitive instructions. Male and female undergraduates worked on a problem-solving measure, under noncompetitive and competitive instructions, in either a single-sex or a mixed-sex group. The results of an analysis of variance failed to support the hypotheses. There was also no significant association between masculine sex-identity and problem-solving performance, contrary to the findings of earlier studies. The results of this study were interpreted as reflecting the change in men and women's attitudes toward achievement over the past 17 years.

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Introduction

This study and the following review are primarily concerned with the differential problem-solving performance of males and females. Problem solving is defined as the process of selecting from a number of alternatives those that lead to a correct solution (English & English, 1958). The problems in Appendix D are representative of the type of insight problems requiring a logical recombination of stimulus elements for solutions, used in the problem-solving literature. Earlier researchers who studied problem solving, reported sex differences incidental to their major findings, since their experiments were undertaken for purposes other than the appraisal of sex differences (Billings, 1934, Guetzhow, 1951, Maier, 1933, Saugstad, 1951).

Billings (1934) was the first to find sex differences in problem solving, which he tried to explain as due to possible differences in the individual background and intelligence of his subjects. His problems were from the masculine fields of mechanics, history, and geometry, in addition to home economics. While males scored 5.5% higher

in general intelligence, their performance on problem solving was 48.7% better than the female subjects. Billings concluded that the men's superiority in problem solving was not explainable by differences in intelligence, nor by the differences in their information scores.

Maier (1933) also found a comparable sex difference to that of Billings. Approximately 20% more men than women were able to successfully solve the problems in his experiment.

The results obtained by Guetzhow (1951) with a Luchins' series of jar problems also demonstrated additional sex differences in problem solving in favor of males. Luchins (1942) had investigated Einstellung or set effect. The subjects were given problems involving the hypothetical use of three containers of different volumes. The first five problems were solvable only by an indirect method; the sixth and seventh problems could be solved by the indirect method or a direct method. The final problem in the series was solvable only by a direct solution. Luchins had demonstrated that the initial five problems, which could be solved only by the indirect method, established a set, the strength of which could be measured by whether subjects solved the sixth and seventh problems by the direct or indirect method. Because of

the habituation to the earlier problems, subjects could continue to apply the more complex, indirect method using the manipulation of all of the containers. The last problem was used as a measure of the ability to overcome set as it was solvable only by the direct method.

Guetzhow found no sex differences for the solutions of the first five problems. Similarly 77% of the males and 73% of the females used the indirect solution for the sixth and seventh problems reflecting the set of the solution of the initial five problems. Thus, males and females were equally susceptible to the establishment of set. However, on the final problem, solvable only by the direct method, 59% of the men and only 42% of the women achieved a solution. Hence, while men and women were both equally susceptible to the establishment of set, men were more able to overcome that set.

In addition, in the same study, Guetzhow reported a sex difference in favor of males in solving a group of twelve reasoning problems. Saugstad (1951) using some of the same problems, also reported evidence of better performance of males than that of females.

Since previous research had been unable to account for the differential performance of the sexes as a function of intellectual factors, researchers focused their

attention on the effects of nonintellectual personality variables upon problem solving.

Sweeney (1953) in a series of experiments demonstrated differences in achievement in problem solving that were not explained by differences in intellectual aptitude, academic training, or special abilities. His male and female subjects were equated on mathematical and verbal aptitude, visualization, comprehension, and mathematical education. Sweeney stated that these unresolved sex differences in problem-solving performance occurred on problems that required restructuring, that is, disregarding of an initial system of organization and attempting a solution of a problem by switching to another approach.

An attempt to explain the sex difference in problem-solving performance as a function of sex differences in attitudes toward problem solving was made by Carey (1958). However, while men were found to have significantly more favorable attitudes towards problem solving, and while there was a positive relation between attitude and performance, the differences in problem solving were not entirely explained by the differences in attitude.

The variable of conformity was chosen by Nakamura (1958) to attempt to account for the differential per-

formance of individuals in problem solving that could not be explained by differences in intelligence. He defined conformity as "behavior that is induced by subjecting individuals in a laboratory setting to conflict-producing social pressure" (p. 315). Nakamura found indirect evidence for such a relation since similar personality traits correlated with both conformity and problem solving. Ethnocentricism and authoritarianism correlated with both conformity and rigidity in problem solving.

Thus, Nakamura reasoned that rigid problem solvers and conformers could possibly share the same personality traits of ethnocentricism and authoritarianism. His results indicated that when the influence of intelligence was accounted for, there was a negative correlation between tendency to conform and problem-solving performance. However, Nakamura failed to provide any evidence that sex differences in problem-solving achievement were explainable by sex differences in conformity.

Milton (1957) conducted a study to examine sex-role identification in relation to problem solving. He explored the possibility that the sex differences in problem-solving skill were due, at least in part, "to a set of learned behaviors that constitute a culturally defined

sex role" (p. 208). He hypothesized that the more a person identified with the masculine sex role, the better would be his or her problem-solving skill. He found that male and female high school students with a more masculine sex-role identification performed better than subjects with a more feminine sex-role identification.

A series of further studies were conducted by Milton (1958) to examine sex-role identification and problem solving with college students as subjects. In his first experiment he replicated his earlier finding of a positive relation between sex-role identification and problem-solving performance. In addition, when the problem-solving scores were treated by an analysis of covariance with an adjustment for the masculinity-femininity scores on the Attitude-Interest Analysis Test, there was no longer a significant difference between the problem-solving performance of males and females.

A second study was done with college undergraduates. Problems were presented in both masculine and feminine format. Thus, he predicted that the differential performance of males and females would be reduced. His results were as predicted, sex differences were eliminated. In addition, he found a significant within sex correlation

such that both men and women who scored in the masculine direction on the Attitude-Interest Analysis Test also solved more masculine role problems. However, there was no relation between sex-identification and the number of feminine role problems solved. Milton suggested that some "fairly transitory motivational aspect is...important" (p. 15) in explaining the remaining sex differences in problem-solving performance and that previous research had not led to a sufficient appreciation of its importance. He hypothesized that men problem solve better not necessarily as a result of having "learned more skill" in this area but rather as a response to a stimulus, problem solving, which is considered appropriate to their male sex-role.

Using high school students in this next study, Milton added an additional factor, the availability of manipulative materials for problem solving. He also included the variable of sex-role appropriate-inappropriate content of problems. He failed to support his prediction that giving students manipulative materials as an aide would help women to solve more problems. Likewise, he failed to replicate his earlier finding that changing the sex-role content to a less masculine format would reduce the differential performance between the sexes. The only

significant result that was as expected, was that males solved a significantly higher number of problems than females. It should be noted that this experiment differed in three major respects from the previous one. First, high school students were subjects in this experiment as opposed to college students in the former. Secondly, manipulative materials were an added factor, and finally the students were individually timed by proctors. Any one, or the combination of any of the three factors, could explain his failure to replicate his earlier results.

The goal of his last experiment was the replication of his earlier finding of an interaction between sex-identification and role appropriateness of the problems. Using college students and returning to the original format of his experiment, he succeeded in supporting his earlier results, that changing the sex-role content to a less masculine format eliminated the differential performance between the sexes (Milton, 1959).

In an attempt to determine the causes of the differential problem-solving performance of males and females, Hoffman and Maier (1961) conducted an experiment using Maier's (1933) horse-trading problem to determine whether group problem solving might be effective in improving

women's performance. Their results supported earlier research that a significantly higher proportion of males than females were able to solve individually the problem correctly without group discussion. After group discussion, male students again produced a significantly higher number of correct responses on their second attempt than female students. Thus, this study supported earlier findings of better problem-solving performance by males.

However, this study produced some interesting findings which qualified that conclusion when the data were analysed according to the sex composition of the groups. Prior to discussion, males had a significantly higher proportion of correct responses than did females in both single-sex and mixed-sex groups. A higher, but not significantly so, number of females in the mixed-sex group had the correct answers than did females in the single-sex group ($p < .10$). After the group discussion the proportions of males and females in the mixed-sex group that solved the problem successfully, did not differ significantly.

In summation, males profited as much from a group discussion in a mixed-sex group as in an all-male group; females on the other hand, profited more in a mixed-sex group than in an all-female group. The important point

is that females in the mixed-sex group performed as well as males in either the all-male group or males in the mixed-sex group. Hoffman and Maier suggested that this improved performance of females in the mixed-sex group could not be explained entirely in terms of conformity, that is that females scored higher as a function of their being exposed to the correct solutions during the discussion, and hence, conforming to a majority opinion. If the factor of conformity was the main variable determining the switching to a correct answer, then the amount of switching should reflect the initial amount of correct answers in the group. This was not true for females or males in the mixed-sex or same-sex groups.

Thus, the authors maintained that women in the mixed-sex group were actively problem solving as opposed to seeking the correct solution from their male classmates. Therefore, Hoffman and Maier hypothesized that female students in the mixed-sex groups were more motivated to achieve a correct solution than females in the all-female groups. They suggested that "the men may have challenged the women to higher performance, have encouraged and guided the women to think through the solution process or merely have provided a legitimation of the problem-solving activity" (p. 455). The authors cited some earlier research

showing how altering motivation improved problem-solving performance, to support their hypothesis that the female students were more motivated to achieve as a function of their presence in a mixed-sex group. Carey (1958) had provided evidence that females' problem-solving performance increased after hearing a lecture aimed at improving their attitudes toward problem solving. Although the lecture did not improve their attitude toward problem solving, their performance improved. Likewise, Maier (1933) had found that the problem-solving performance of women improved as a result of a lecture on problem solving. Hoffman and Maier theorized that in both experiments, the women were motivated to utilize their potential and work harder in order to achieve a correct solution. Meanwhile, women in the control group approached the problems with their usual attitudes and motivation and thus failed to improve their usual poor performance.

Hoffman and Maier (1966) continued to examine conditions which might motivate women to improve their problem-solving performance. They rejected a direct approach to motivate the women on the basis of earlier research in the achievement motivation literature, which had shown that attempts to arouse achievement motivation in females by appealing to their leadership and intellectual capacities

had failed, unlike the results for males (McClelland, Atkinson, Clark, and Lowell, 1953). In addition, Douvan and Adelson (1965) had hypothesized that young women could be motivated more effectively by appealing to their nurturant and affiliative abilities. Consequently, Hoffman and Maier theorized that women's problem-solving performance would increase if the experimenter would appeal to their nurturant and affiliative motives. The authors also manipulated the sex of the experimenter on the assumption that women might be less likely to reject problem-solving activity as a female activity in the presence of a female experimenter.

In the first phase of their experiment, the authors used only one problem, manipulated the sex of the experimenter, and included the variable of additional motivation. The problem used was the horse-trading problem, used in previous studies (Hoffman & Maier, 1961; Maier, 1933; Milton, 1957, 1958, 1959). In the experimental condition, the following procedures were used. First, a motivational talk was given, the booklets were passed out, encouragement was given again and the students were instructed to solve the problems within a one minute solution time. The booklets were collected, another talk was given, and the students were given another two minutes to

solve the problem again. In the second phase of the experiment, a motivational talk was given one last time, and then the students attempted to solve eight more problems. Hoffman and Maier used both masculine and feminine forms of the problems with the expectation that females would perform more successfully on the feminine format of the problems.

In the standard no-motivational-talk-condition, for the first and second administration of the horse-trading problem significantly more males than females achieved the correct solution. In the experimental motivational attempt condition, the motivational attempt, whether given by male or female experimenters, had no effect on performance on the first administration of the horse-trading problem.

On the second administration of the problem, the effects of the motivational talk interacted with the sex of the experimenter to significantly alter performance. The motivational talk by male experimenters enhanced the performance of males and females, while the same talk by female experimenters inhibited the performance of males and females. In contrast, under the standard no motivational talk condition, female subjects performed better with female experimenters than they did with male experi-

menters.

An analysis of covariance for mathematical aptitude was performed on the data of the eight problems from the second phase of the experiment. There were no significant results for the variables of sex of experimenter, sex of subject, motivational condition, or format of the problems. Hoffman and Maier maintained that there still was room for improvement in the women's performance as the men had scored higher.

Hoffman and Maier posited a possible explanation of why female students' motivation to perform on the horse-trading problem was affected by the experimental manipulations. They suggested that women's poor performance in previous studies, which had utilized the horse-trading problem, reflects more their lack of motivation than ability. Thus, male experimenters' appeal to achieve "in a masculine activity produces a conflict in women between conforming to authority and being feminine" (p. 388). In this study, however, the male experimenter's request was constructed to appeal to satisfying nurturant and affiliative motives. Thus, any conflict between participating in a masculine activity, that is problem solving, and the female students' femininity was resolved. Similarly, under the standard condition no conflict was aroused when

the experimenter was a female as the students were able to identify with the experimenter. Hoffman and Maier theorized that with the female experimenter's appeal for help "a new conflict is established between affiliative motives and nurturant motives toward an inappropriate object, which conflict has an inhibiting effect" (p. 388). They also suggested an alternative hypothesis, that male experimenters via their talk indicated that women could solve problems and thereby reduced their fear of failure just as the presence of the female experimenter in the standard condition did. However, the motivational talk by the female experimenter may have aroused just such fears of failure and thereby produced negative performance.

Hoffman and Maier concluded on the basis of their results that support was provided for their thesis that a "variety of social factors...tend to inhibit women's performance" in problem solving (p. 387). Since Hoffman and Maier's results from one problem administered alone were inconsistent with the results from a series of problems, these "social factors" that influence performance are not only complex but transitory.

Robbins (1973) found that appeals to women's nurturance motives and additional encouragement did not

improve their problem-solving performance. Also, there was no significant difference on the number of masculine version and feminine version problems that they solved.

Since subtle, complex factors affect the problem-solving performance of females, competitive and noncompetitive conditions should surely affect women's performance in problem solving. Although there are many studies examining the variable of competition, no study has examined the effect of competition on problem-solving performance.

Based on the belief that competitiveness and dominance are related to aggression, males have frequently been described as being the more competitive sex. This belief has probably been based on the large number of studies that have shown males to be more aggressive than females (Barclay, 1970; Buss, 1966; Devi, 1967; Larsen, Coleman, Forbes & Johnson, 1972; Shuck, Shuck, Hallam, Mancini & Wells, 1971). Maccoby and Jacklin (1974) have pointed out that the thesis that males are more competitive is "based on commonsense considerations, ... not upon research in controlled settings" (p. 353).

When sex differences in competition have been studied, although males have usually been shown to be

more competitive (Kagan & Madsen, 1972; Shapira & Madsen, 1969; Shears & Behrens, 1969; Stingle, 1973) a large number of studies have been inconclusive (Kershenbaum & Kamirita, 1970; Marwell, Schmitt, & Shotola, 1971; Miller & Thomas, 1972; Speer, 1972; Swingle, 1970; Voissem & Sistrunk, 1971).

Most research that has shown that males are more competitive has involved situations where competition is maladaptive and cooperation is a necessity for winning. Since these studies do not control for the fact that cooperation is advantageous, they do not show that women are less competitive when it is to their advantage to be competitive, but rather that men choose to be competitive even if it is to their disadvantage to be so.

Another area which lends support to the theory that males are more competitive than females is based on the earlier research in achievement motivation. Under neutral instructions females gave more achievement imagery than males, while under conditions which stressed academic competition, males gave increased achievement imagery (McClelland et al, 1953). It is important to note that males and females did not differ on amount of achievement imagery, but only that

they responded to different cues; males responded to competitive instruction and females to more relaxed directions.

Present Study

This study was designed to examine experimentally two conditions under which women's problem-solving performance might be enhanced. Simple extrapolation from earlier research had suggested that women might be more motivated to problem solve as a function of their presence in a mixed-sex group (Hoffman & Maier, 1961). It also seemed plausible that if women were given instructions that were perceived as sex-role appropriate their problem-solving performance would be enhanced.

The first hypothesis predicts that males would problem solve better than females. It is anticipated that results of this investigation will reaffirm sex differences demonstrated by earlier researchers (Carey, 1958; Hoffman & Maier, 1961; Maier, 1933; Milton, 1957, 1958; Nakamura 1958).

The second hypothesis posits that women's problem-solving performance would be enhanced by their presence in a mixed-sex group. Hoffman and Maier found that more

women in a mixed-sex group obtained the correct answer to the horse-trading problem than women in a same-sex group, even though no interaction was allowed within the group. With the intense examination of sex roles that has occurred in North American society since this study was done, it seems plausible that this effect of enhanced female performance in a mixed-sex group should reoccur.

The third hypothesis states that women would perform better under noncompetitive instructions than competitive instructions. This seems likely since competition would be perceived as inappropriate to the feminine sex role (McClelland et al, 1953) and their performance would be inhibited.

The fourth hypothesis predicts that women in a mixed-sex group under noncompetitive conditions would perform as well as men in both the same-sex and mixed-sex groups. Since women would be more motivated to perform in this condition, their scores should not differ from the norm of the two male groups.

The fifth hypothesis states that there would be a positive association between masculine sex-role identification and problem-solving scores both within sex and across sexes. Earlier studies have shown a positive

relation between problem-solving success and masculine sex-role identification (Milton, 1957, 1958). This research is being extended to sex-role identification in association with problem-solving success as a function of noncompetitive and competitive instructions.

Method

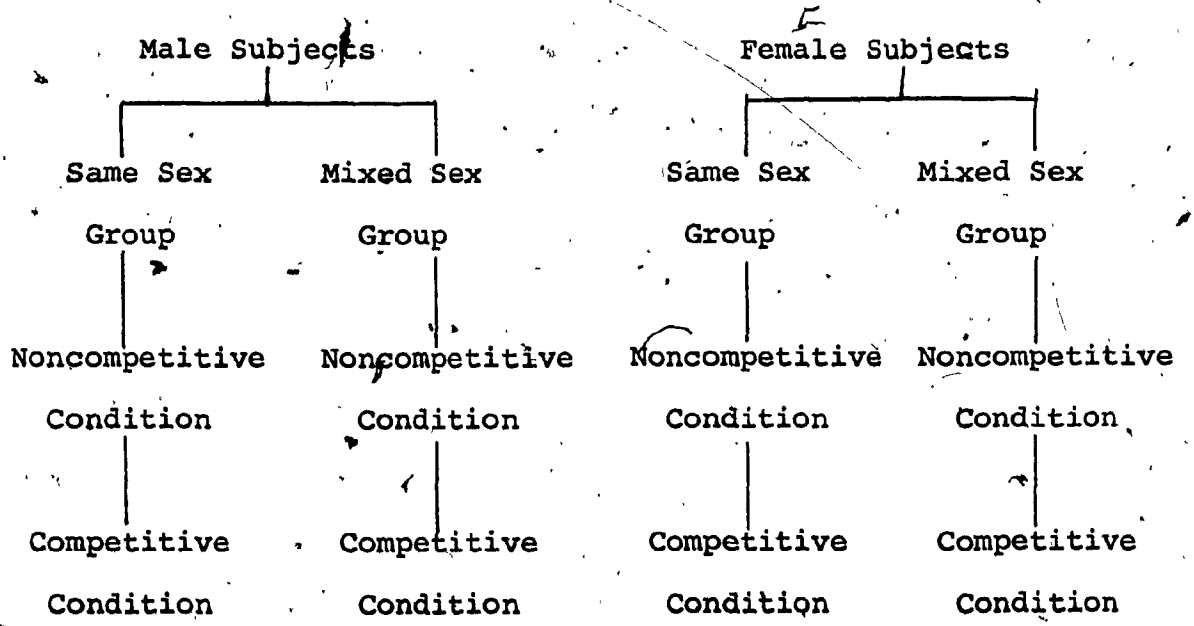
A series of pilot studies was conducted to assess the appropriateness of the various problems, measures, and procedures to be used in the present study. The procedure and results of the pilot work are reported in Appendix A. The design of the current experiment is presented in Table 1.

Measures

An intelligence test was used to match the subjects in the different conditions for intellectual ability. Part II - Analogies of Form B of the Concept Mastery Test (Terman, 1950), as used by Nakamura (1958) was administered to all students. It has been found that the test correlates with Gough's College Vocabulary Test with correlation coefficients ranging from .68 to .77. The reliability of the test has been calculated by the parallel form method and is satisfactory with coefficients

Table 1

Schema of Experimental Procedure



ranging from .86 to .94 (Keats, 1959). The Analogies Test is presented in Appendix B.

The Attitude-Interest Analysis Test (Terman & Miles, 1936), previously used by Milton (1957, 1958), was administered to obtain an indirect measure of sex-role identification. The rationale of this sex-role scale was based on the finding that males and females "display characteristic sex differences in their behavior" (p. 1) and that these differences are quite basic and affect an individual's entire personality. The test attempts to "sample sex differences in a large variety of fields" without the subject's perceiving the true purpose of the test, which "is to make possible a quantitative estimation of the amount and direction of a subject's deviation from the mean of his or her sex" (p. 6).

The validity of the Attitude-Interest Analysis Test is based on the contrasting group approach, with the test being administered to males and females and the subsequent finding of small overlap in the distributions of scores of the two sexes. Homosexuals, both males and females, scored significantly differently, in the expected directions, from heterosexuals on the test.

Construct validity has also been demonstrated by studies that have found that the test correlates with mechanical aptitude, physical measurements, teachers' estimates of the masculinity-femininity of students, behavioral ratings by peers, and personality characteristics, such as ascendancy (Stanek, 1959; Terman & Miles, 1936).

The reliability of the test has been calculated by the split-half and parallel form methods and is satisfactory for research with coefficients ranging from .72 to .96.

The instrument used in this study is a shortened and revised form of the Terman-Miles seven subtest, 910 item questionnaire, which results in a five subtest, 386 item form which can be administered in 35 minutes. The revised form is presented in Appendix C. Two sections of the original test, that have the largest overlap in scores between males and females, and the lowest reliabilities, were dropped from the scale for this study.

The problem-solving measure contained eight problems selected from previous research (Hoffman & Maier, 1966; Maier & Solem, 1952; Milton, 1959; Sweeney, 1953). The problems were revised to make one version appropriate to both masculine and feminine sex-roles. Students

received three minutes to solve each problem. The answers were scored either correct or incorrect with no partial credit allowed. See Appendix D for the problems as numbered for this experiment.

Procedure

This study was conducted at the Loyola campus of Concordia University and the Viger campus of Dawson College. Three introductory psychology classes, two at Dawson and one at Loyola, were used in this study. A total of 56 students, 28 males and 28 females, participated in the experiment. See Table 2 for the breakdown according to schools. All students were volunteers and testing was conducted during regularly scheduled classes. The pretesting was conducted by the class instructors who asked for volunteers to take part in some research. Each student completed a brief biographical questionnaire and a booklet containing the Analogies Test and the Attitude-Interest Analysis Test. Students were allowed 20 minutes to complete the Analogies Test and were then instructed to complete the Attitude-Interest Analysis Test. The booklets were collected and the students were informed of the date of debriefing, so as not to alert them to the fact that

Table 2

Number of Males and Females Assigned to Same-Sex and Mixed-Sex Group by Schools

	Males		Females	
	Same-Sex	Mixed-Sex	Same-Sex	Mixed-Sex
Dawson	7	9	9	9
Loyola	7	5	5	5
Total	14	14	14	14

this testing was in any way related to the experimental manipulation that was to follow in the next session.

Approximately two weeks later the instructors asked their students to volunteer for a second experiment. Students were randomly assigned to one of three experimental groups, to an all-male group, an all-female group, or a mixed-sex group. The pilot studies had shown that there was no significant effect of either the order of presentation of the problems or condition, and that the problems were equivalent in difficulty as a group. Consequently, the experimenters, three female graduate students, first gave the instructions for the noncompetitive condition with problems 1 - 4, followed by the competitive condition with problems 5 - 8.

The instructions given to each of the three groups were identical except for additional information included to draw the students' attention to the sex composition of their group.

The instructions for the three groups were:

On the next four pages are some problems that we thought women (men, or men and women) such as yourselves might enjoy solving. The problems have been selected on the basis of past research in the area. We thought that some women (men, or men and women)

at (Loyola, Dawson) might like to see how well they could do.

We ask that each of you try and do as well as you can. Your scores will be kept confidential. You are invited to spend up to three minutes solving each problem.

If you finish before the end of the time limit you may wish to recheck your answers and then wait for further instructions before you continue on to the next page. Please do not go back to earlier problems. When the signal is given please turn the page and begin working on the next problem.

Remember that the scores of each woman (man, or man and woman) will be kept confidential so go ahead and see how well you can do.

Immediately after completion of the first four problems the experimenters introduced the competitive instructions for the last four problems. During the competitive condition the experimenters again drew the students attention to the sex composition of their respective group.

The next four pages contain a test to assess which woman (man, man or woman) is the best problem solver in this group. The next four problems have been carefully selected to discover how well each of you can solve problems compared to your classmates.

You are competing against each of the other women (men, men and women) in this group to see who can get the highest score.

You will work on each of the four problems as you did before during the practice with a three minute time limit per problem. If you finish a problem before the end of the time limit, recheck your answer and wait for instructions before you continue on to the next problem. Do not go back to earlier problems. When the signal is given please turn the page and begin working on the next problem.

Remember, you are competing against the women (men, men and women) in this group to ascertain which student is the best problem solver. There will be only one top scorer so be careful to indicate your answers clearly.

A post-experimental questionnaire was attached to the problem-solving booklets. The students were asked to rate their motivation during the noncompetitive and competitive conditions and to indicate in which condition they felt more motivated.

When the students were finished they were instructed to leave their booklets on their desks and to return to their classromms. The experimenter thanked the students for their participation and debriefed them as to the purpose of the investigation. Each experimenter presented the instructions to an all-male, an all-female, and a mixed-sex group, thus counterbalancing the design. The biographical questionnaire requested name, age, sex, marital status, and major area of study. No mathematics of economics majors partook in the study.

The mean masculinity-femininity scores for males in the same-sex group and in the mixed-sex group, and for females in the same-sex and in the mixed-sex group were 47.71, 53.93, -34.64, and -36.93, respectively. A one-way analysis of variance revealed a significant difference among the groups ($F = 33.14$, $df = 3,52$, $p < .001$). The Scheffé Test revealed that males in the same-sex and mixed-sex groups did not differ significantly from

each other. Likewise, females in the same-sex and mixed-sex groups did not differ significantly. But, males in the same-sex and mixed-sex groups scored significantly higher than females in the same-sex and mixed-sex groups.

The mean Analogies scores for males in the same-sex and mixed-sex groups, and females in the same-sex and mixed-sex groups were 32.43, 27.47, 31.14, and 32.11, respectively. When tested by a one-way analysis of variance these scores did not differ significantly from one another ($F = .41$, $df = 3,52$, $p > .05$). Thus, the groups were equated for intellectual ability.

The post-experimental questionnaires were examined to check the efficacy of the experimental manipulation, that is to ascertain whether the competitive instructions were perceived as motivating by the students. At Loyola 79% of the males and 89% of the females reported feeling more motivated to perform well in the competitive condition than the noncompetitive condition. At Dawson, 80% of the males and 67% of the females reported feeling more motivated in the competitive than the noncompetitive condition. Thus the experimenters' instructions emphasizing competition were effective in having the students perceive themselves as competitors. Analysis of the post-experimental questionnaire indicated

that no subjects had suspected the true purpose of the study.

Results

Since the subjects for this study came from two institutions, reflecting different educational levels, the variable of schools was added to the analysis of variance performed on problem-solving scores.

Consequently, an unweighted means repeated measures analysis of variance of Schools (Dawson, Loyola) x Condition (same-sex, mixed-sex) x Sex of Subject (male, female) x Instruction (noncompetitive, competitive) was performed on the dependent variable, the number of problems solved (Table 3). The results of the analysis of variance fail to support the hypotheses based on previous research.

Hypothesis 1, based on the results of the past research showing that males perform better than females, posits that sex differences in this investigation would favor males. The difference in performance between men and women is not significant ($F = .21$, $df = 1,48$, $p > .05$). Thus, the sex differences found by previous researchers are not repeated in the current investigation.

Hypothesis 2 predicts that the women's problem-

Table 3

Summary Table for Analysis of Variance of Problems Solved as a Function of School, Condition, Sex, and Instruction

Source	SS	df	MS	F
Between Subjects				
School (S)	2.07	1	2.07	2.23
Condition (C)	.97	1	.97	1.05
Sex (Sx)	.19	1	.19	.21
S x C	1.46	1	1.46	1.58
S x Sx	.01	1	.01	.01
C x Sx	.25	1	.25	.27
S x C x Sx	.03	1	.03	.03
Error Between	44.41	48	.93	
Within Subjects				
Instruction (I)	3.28	1	3.28	2.69
S x I	5.57	1	5.57	4.56*
C x I	.01	1	.01	.01
Sx x I	3.82	1	3.82	3.12
S x C x I	.83	1	.83	.68
S x Sx x I	.12	1	.12	.10
C x Sx x I	.01	1	.01	.01
S x C x Sx x I	.14	1	.14	.11
Error Within	58.64	48	1.22	

*$p < .05$

solving performance would be enhanced by their presence in a mixed-sex group. The result for the Condition x Sex interaction are insignificant (F = .27, df = 1,48, $p > .05$), showing that women's problem-solving performance is unaffected by the sex of their coworkers.

To test Hypothesis 3, that women would perform better with noncompetitive instructions, the Sex x Instruction interaction is examined. The interaction approaches significance, (F = 3.12, df = 1,48, $p < .10$) indicating that women tend to perform better under the noncompetitive than the competitive conditions, while the men tend to perform better under the competitive than the noncompetitive conditions (Table 4).

Hypothesis 4 states that women in the mixed-sex group under noncompetitive instructions would perform as well as males in the same-sex and mixed-sex groups. Since there are no significant differences among the groups as analysed by the Sex x Condition x Instruction interaction, (F = .68, df = 1,48, $p > .05$) support is gained for Hypothesis 4. However, the facts that women in the mixed-sex group did not perform significantly better than women in the same-sex group and women in the noncompetitive condition did not perform better than women in the competitive condition, indi-

Table 4

Mean Number of Problems Successfully Solved by Males and Females under Noncompetitive and Competitive Instructions

	Instructions	
	Noncompetitive	Competitive
Males	.93	1.57
Females	1.25	1.07

n = 28 subjects in each group

cate that this result is due to the lack of general sex differences and is not due to enhanced performance in the mixed-sex noncompetitive group as hypothesized.

The last hypothesis posits a positive association between masculine sex-role identification and problem-solving scores both within sex and across sexes. In order to test this hypothesis four problem-solving scores were calculated for each student. Each student received a noncompetitive score, a competitive score, a difference score (competitive score - noncompetitive score), and a total problem-solving score (noncompetitive + competitive score). Correlations were performed between the sex-identification measure and each problem-solving score both within sex and across sexes. The correlations are presented in Table 5. There are no significant associations between the sex-identity measure and any of the problem-solving scores, either for within sex or across sexes.

Although not predicted, the analysis of variance reveals one significant interaction, that of School x Instruction ($F = 4.56$, $df = 1,48$, $p < .05$). The Scheffé Test, modified by the Cicchetti approximation (1972), reveals that students at Loyola performed significantly better under the competitive than the noncompetitive

Table 5

Pearson Correlation Coefficients of the Sex-Role Measure* with Noncompetitive, Competitive, Difference, and Total Problem-Solving Scores for Males, Females, and Both Sexes Combined

	Males	Females	Combined
Noncompetitive	-.19	.02	-.22
Competitive	-.13	.04	.14
Difference	-.02	.02	.21
Total	-.24	.05	.01
n =	(28)	(28)	(56)

*higher scores on the sex-role measure indicate a more masculine identification.

instructions, while the students at Dawson performed equally well under both sets of instruction.

Discussion

The fact that this investigation did not find any support for the main hypothesis of better performance by males, as had been demonstrated by many earlier studies, is surprising, but only until some pertinent literature is reviewed. It is important to remember that earlier researchers were unable to find any intellectual differences to account for the sex difference in problem-solving performance. Consequently, after the mid-1950's, researchers focused their attention on nonintellectual variables that could explain this difference. The underlying logic inherent in this change of focus is that women are intellectually capable of problem solving as well as men, but that some unknown factor must be impeding their performance. Researchers (Carey, 1958; Milton, 1957, 1959) had already demonstrated that the social factor of sex-role development was a powerful determinant of how well an individual could problem solve. Similarly, Hoffman and Maier (1961, 1966) showed that certain variables could also have transient, short-term effects. However, research-

ers had been unable to manipulate social variables so that women's performance would no longer be inhibited and therefore would be equal to men's performance. While Nakamura (1958) demonstrated a relation between problem solving and conformity, Carey, (1959) an association between women's attitudes and their performance, and Milton, (1957, 1958) that sex-role identification correlated with problem-solving performance, no one had demonstrated similar performance between the sexes on the problem-solving measure.

It is also important to note that the last experiment demonstrating a sex difference on solving a group of problems was conducted in 1959 (Milton). During the 17 year interim since that last study and this current investigation, young men and women in North America have grown up in a milieu of feminist activity, which has attempted to alter traditional stereotypes of male and female sex roles. The feminists' aim has been to motivate society to reformulate sex roles within a more androgynous framework.

There is some support for the idea that the feminist movement's affirmative actions have had some effect on people's attitudes. As a result of the impetus of the feminist movement, some social and political insti-

tutions have initiated egalitarian policies. These changes appear to be reflected in different attitudes and behaviors by women in educational achievement situations. For example, Jones (Note 1) reports that there is an increasing enrollment of women in the McGill Law School. Currently 33% of the first-year enrolled students in the law faculty are females, as compared to the North American average of 8% in 1970 (Morlock, 1973). A similar increase has occurred in the medical faculty. Kinch (Note 2) reports that 40% of the first-year admissions at McGill Medical School are women compared with 7% 19 years ago and 12.5% nine years ago for all of Canada (Bird et al, 1970). It is also noteworthy that a great many recent studies, which have attempted to replicate, repeat, and extend Goldberg's work (1967, 1968), demonstrating women's negative attitude toward feminine achievement, have been unsuccessful (Chobot, Goldberg, Abram, Abramson, 1974; Hough & Allen, 1975; Levenson, Burford, Bonno, & Davis, 1975; Pheterson, Kiesler, & Goldberg, 1971). This would suggest that more women now perceive scholarly achievement as sex-role appropriate for themselves, as opposed to their views in the early 1950's (McClelland et al, 1953).

Similarly, it appears that men have also changed

their attitudes toward achievement. Recent research in achievement motivation suggests that there is a tendency for males to reject the conventional masculine goal of achievement (Feather & Simon, 1973; Lunnenborg & Rosenwood, 1972; Morgan & Mauser, 1973; Robbins & Robbins, 1973). The fact that in this study the level of women's problem-solving performance remains roughly the same as in previous studies despite the continual decline of college aptitude scores (Zajonc, 1976), while the performance of men has declined perceptibly, 34% to 29% for females as compared with 48% to 31% for males, is consistent with these recent tendencies.

It may be that the subjects, both males and females, in this current investigation, are reflecting the social and political changes of the past 17 years by their similar performance on the problem-solving measure.

Likewise, a recently completed study (Gold & Berger, 1976) did not find a sex difference in the problem-solving performance of preschool children. It may be that the results of the Gold and Berger study and this investigation are reflecting a trend toward greater equality of achievement by males and females that future experiments will confirm.

An additional reason why this study failed to

uncover sex differences, may be due to factors more intrinsic to the study. There is some support for the idea that moving problem content away from the masculine pole enhances female performance (Milton, 1959). Conversely, Hoffman and Maier (1961) demonstrated that male subjects found a feminine problem format significantly more difficult to solve. It is logical that to assess the problem-solving performance of males and females fairly, a neutral sex-role problem format should be used, as was done in this study. However, since this was the first study to use a neutral format for problems, it is likely that some of the past reported sex differences in problem solving, reflect biasing factors in the problem format used in the earlier studies.

Milton (1959) found a significant association between masculine sex-role identification and the number of masculine format problems solved correctly for both males and females. This relation did not exist between masculine sex role and feminine problems solved. Likewise, no relation was found between sex-role identification and number of neutral content problems solved in this investigation. This suggests that the relation is specific only to number of masculine content problems solved and any attempt to minimize the masculine content

eliminates any association with sex role.

It is unlikely that the absence of any sex difference in problem solving in this study is due to any ineffectiveness of the experimental manipulations. The efficacy of the experimental manipulation, that is of the noncompetitive-competitive factor, was supported by the significantly better performance of the Loyola students under the competitive condition, who also reported on the post-experimental questionnaire, the greater salience of the competitive instructions. Further support of the validity of the experimental manipulations was demonstrated by additional results on the post-experimental questionnaire which showed a higher percentage of Loyola and Dawson students reported feeling more motivated as a result of the competitive instructions.

These results increase the confidence that the absence of sex differences in this study is a valid finding, especially in light of the consistency of these results across several experimenters, different school samples, and three experimental sessions conducted at different times. In addition, it is noteworthy that this investigation used the same problems as earlier research, with the number of problems used falling within the range of those of previous studies. Likewise the

number of subjects tested falls within the range of those used in other problem-solving experiments. However, it is interesting to note that some of the earlier significant results were obtained in studies which used a smaller number of subjects and only one problem namely, the horse-trading problem, which is a masculine problem. On other methodological points as well, this study differs from previous research in this area in such a way as to obtain a more accurate sample of problem-solving ability in males and females. While other studies have used a four minute time limit, which Milton (Note 3) agrees is excessive and may induce boredom, this study allows three minutes per problem. In addition, as mentioned earlier, this study is the first to use a more accurate unbiased assessment of problem-solving ability, namely a sex-neutral problem format. Thus, the finding of similar problem-solving ability of males and females in the present study should be considered seriously.

The aim of this thesis was to find variables that would enhance women's problem-solving performance to the level of their male classmates. Although, no support was found for any of the proposed hypotheses, the fact that women problem solved as well as men is certainly a significant finding and merits further investigation.

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Appendices

APPENDIX A

Report of the pilot work

The pilot work which preceded the present study was conducted with undergraduates from Concordia University and Dawson College. The pilot study was designed to assess the appropriateness of the Attitude-Interest Analysis Test, Part II of the Concept Mastery Test, and a problem-solving measure, and to determine if there were order effects of the presentation of the problems or of the presentation of instructions.

1. The Attitude-Interest Analysis Test. Five of the seven subtests of the Terman-Miles inventory (1936) were administered to 19 students, 15 males and 4 females at the Viger campus of Dawson College, and to 10 students, 3 males and 7 females at the Sir George Williams campus of Concordia University during the spring of 1975. The results of the pilot study indicated that the Attitude-Interest Analysis Test was still a valid discriminator of male and female sex roles. The range of male scores was +3 to +102 with a mean of +59.31; for females the range was -104 to +37 with a mean of -41.45. Thus, the scores of the male and female students in this sample differed significantly. In addition to the exclusion of

the two subtests as recommended by Constantinople (1973), various individual items were deleted on the basis of their being inappropriate for our Canadian sample (refer to Appendix C for the final revised version).

2. The Concept Mastery Test. It was decided to evaluate the usefulness of Part II - Analogies of the Concept Mastery Test as a possible measure of general intelligence for this study. The Analogies Test was administered to the Dawson College sample of undergraduates who received the Attitude-Interest Analysis Test. The scores for the 19 students ranged from 0 to 42, with a standard deviation of 13.25, and a mean of 18.84. This was considered a sufficient range and thus the Analogies Test was chosen as the measure of intelligence. Appendix B contains the Analogies Test.

3. Problem-Solving Measure. Modifications were made on the problems utilized by Maier (1933), Milton (1959), and Sweeney (1953), which resulted in one neutral version of the problems which was both male and female sex-role appropriate. The next step was to determine whether the order of presentation of the problems would affect the number of correct responses. The problems were divided arbitrarily into two groups of four problems each, and labelled problems 1 - 4 and problems A - D. The pilot

work was run at the Loyola campus of Concordia University during the summer of 1975. Twelve students, 2 males and 10 females were allowed four minutes to solve each problem. Thus, some students received problems A - D first, followed by problems 1 - 4, while the remaining subjects received problems 1 - 4, followed by problems A - D. The results indicated that there was no significant effect of order of presentation of the problems on the number of correct solutions.

The next issue was to ascertain whether the order of presentation of the noncompetitive and competitive instructions would affect the number of correct responses. Undergraduates at the Sir George Williams University campus, 29 females and 26 males, participated in the study during September 1975. Some students received problems 1 - 4 administered with the competitive instructions, followed by problems A - D with the noncompetitive instructions, while the remaining students received problems A - D with the noncompetitive instructions first, followed by problems 1 - 4 with the competitive instructions. All instructions were contained in the problem-solving booklets. Students were allotted three minutes solution time per problem. The results of the pilot study indicated that there was no significant effect of

the order of presentation of the instructions on the number of correct responses.

The results of this study, on the order of the instructions, combined with the data from the Loyola sample, on the order of presentation of the problems, made it possible to divide the eight problems into two new groups such that both groups were equated for difficulty. See Appendix D for the problems as labelled for the investigation.

4. The Noncompetitive Instructions Used with Problems A - D.

On the next four pages are some problems that we thought you might enjoy solving. They have been selected on the basis of past research in problem solving and we feel they might be fun to solve if you would like to see how well you can do.

All of the students in this class are being asked to try and see how well they can do. Your scores will be kept confidential and you are invited to spend up to three minutes solving each problem.

If you finish a problem before the end of the time limit you may recheck your answer and wait for instructions before you continue on to the next page. Do not go back to earlier problems. When the signal is given

please turn the page and begin working on the next problem.

Remember, your scores will be kept confidential so go ahead and see how well you can do. Enjoy yourself.

5. Problems A - D.

A. A snail starts at the bottom of a well 12 feet deep and crawls up 4 feet each day. Each night, however, the poor thing slips back 3 feet. How long will it take the snail to reach the top of the well?

B. Suppose you are interested in how fast a rumor spreads through the cafeteria. One student can tell another student the news in 3 minutes. Every new student can tell one other student the news in 3 minutes. If one student gets a piece of information it takes one hour for the news to get all around the cafeteria. How long will it take for a rumor to cover the whole cafeteria if 2 students hear it at the same time?

C. How can you measure out exactly six quarts of liquid when you have only a four-quart container and a nine-quart container to measure with? (Liquid is in a large barrel.)

D. A decorator ordered 1,000 yards of drapery material. There was enough to provide four yards for each long drape and two yards for each short drape that the

decorator had on order. All together there were orders for 296 drapes. How many long drapes and how many short drapes had been ordered?

6. The Competitive Instructions Used with Problems 1 - 4.

This is a test to discover which student in your class is the best problem solver. The next four problems have been carefully selected to assess how well you can solve problems compared to your classmates.

You will be competing against all the other students in this classroom. We want to find out who will achieve the best score. At the end of the week you will be told how well you did.

You will work on the following four problems, each with a three minute time limit. If you finish a problem before the end of the time limit, recheck your answer and wait for instructions before you continue on to the next problem. Do not go back to earlier problems. When the signal is given please turn the page and begin working on the next problem.

Remember, you are competing against your classmates in order that we may discover which student is the best problem solver. There will be only one top scorer so be careful to indicate your answers clearly.

7. Problems 1 - 4.

1. A student bought a car for $600, sold it for $700, bought it back again for $800 and sold it again for $900. How much money did the student make?
2. Students A, B, and C have $36. B has twice as much as C, and A has as much as B and C together. How much money does A have?
3. An unknown individual bought a bicycle for $15 and gave in payment a cheque for $25. The dealer went to a neighborhood store and cashed the cheque. The stranger received $10 change, mounted the bicycle, and disappeared. The cheque bounced and the dealer had to make it good. The bicycle cost the dealer $11. How much money did the dealer lose all together?
4. If 7 students can do a job in 21 days, how many days will it take 3 students to do the same job?

Appendix B – Analogies

Directions: Each line in this test can be made a true statement by using one of the three responses in parentheses.

For example, Item X below is read, "Shoe is to Foot as Glove is to a. Arm b. Elbow c. Hand."

The correct answer is Hand, because Hand is related to Glove as Foot is related to Shoe. Under EXAMPLES on your answer sheet, line X, write the letter c to show that choice c is the correct answer.

In item Y below, the correct answer is b. Cow, so you write the letter b next to line Y on your answer sheet.

Read each line and decide which one of the three responses is correct, a, b, or c, and mark your choice on your answer sheet. Be sure for each item that the line on the answer sheet is numbered the same as the question you are answering. Omit those that you would have to answer by pure guess.

Example:

X. Shoe : Foot :: Glove : a. Arm b. Elbow c. Hand
Y. Kitten : Cat :: Calf ; a. Horse b. Cow c. Lion

1. Ocean : Pond :: Deep : a. Shallow b. Well c. Sea
2. Many : Few :: Often : a. Frequent b. Seldom c. Never
3. Scissors : Cloth :: Scythe : a. Wood b. Steel c. Grass
4. Fore : Aft :: Bow : a. Deck b. Boat c. Stern
5. Circle : Square :: Sphere : a. Geometry b. Cube c. Ball

6. Melted : Frozen :: Liquid : a. Soft b. Water c. Solid
7. Order : Confusion :: Peace : a. Treaty b. Enemy c. War
8. Most : Least :: Best : a. Good b. Worst c. Poor
9. Framework : House :: Skeleton : a. Body b. Bones c. Skull
10. Wise : Foolish :: Vain : a. Modest b. Pretty c. Conceited

11. Aspen : Tree :: Armadillo : a. Dagger b. Animal c. Shrub
12. Antlers : Deer :: Antennae : a. Amoeba b. Starfish c. Grasshopper
13. Love : Caress :: Anger : a. Strike b. Patience c. Temper
14. File : Style :: Fight : a. Enemy b. Quarrel c. Spite
15. Whitney : Cotton gin :: Edison : a. Motion picture b. Telephone c. X-ray

16. Harrow : Cultivation :: Dray : a. Painting b. Hauling c. Plumbing
17. Enough : Excess :: Sufficiency : a. Surplus b. Adequacy c. Competency
18. North : South :: Northeast : a. Southwest b. Southeast c. Northwest
19. Cat : Carnivorous :: Pony : a. Horse b. Herbivorous c. Ruminant
20. Sugar : Meat :: Carbohydrates : a. Proteins b. Fats c. Vitamins

21. Newton : Calculus :: Copernicus : a. Geography b. Archaeology c. Astronomy
22. Mexico : North America :: Rhodesia : a. Australia b. Africa c. Europe
23. Cornea : Eye :: Cochlea : a. Spine b. Heart c. Ear
24. Square of 1 : Square of 2 :: 1 : a. 2 b. 4 c. 8
25. Backward : Forward :: Ancestry : a. Lineage b. Progeny c. Prototype

26. Rabbit : Timid :: Lion : a. Fierce b. Dangerous c. Bold
27. English : Australia :: Portuguese : a. Brazil b. Puerto Rico c. Costa Rica
28. Optic nerve : Sight :: Olfactory nerve : a. Hearing b. Smell c. Taste
29. Labor : Wages :: Capital : a. Industry b. Stockholder c. Interest
30. Certify : Attest :: Captivate : a. Fascinate b. Admire c. Castigate

31. 8 1/3 : 100 :: Month : a. Season b. Year c. Time
32. Georgians : Russia :: Basques : a. Italy b. Switzerland c. Spain
33. 1/3 : 2 :: 10/15 : a. 6 b. 5 c. 4
34. Vergil : Aeneid :: Matthew : a. Psalms b. Mark c. Gospel
35. Tuberculosis : Tubercular :: Dementia : a. Demeanor b. Demented c. Dement

36. Nature : Nurture :: Heredity : a. Ancestry b. Environment c. Health
37. Pretentious : Pretension :: Decorous : a. Decoration b. Decorum c. Deceptive
38. Cube of 2 : Cube of 3 :: 8 : a. 12 b. 16 c. 27
39. Proletarian : Worker :: Brahmin : a. Bull b. Aristocrat c. India
40. Bacchus : Revelry :: Ceres : a. Agriculture b. Love c. Hunting

41. Ontario : Canada :: Yucatan : a. Alaska b. Mexico c. Guatemala
42. Entomologist : Insects :: Philologist : a. Philosophy b. Logic c. Language
43. 1/8 : 3/16 :: 10 : a. 30 b. 15 c. 5
44. Binocular : Telescope :: Bicameral : a. Photography b. Legislature c. Dromedary
45. Atone : Expiate :: Elicit : a. Evoke b. Illicit c. Exploit

46. Annual : Perennial :: Deciduous : a. Floriferous b. Evergreen c. Changeable
47. Harvey : Circulation :: Lister : a. Antisepsis b. Vaccination c. Anesthesia
48. 7 : 11 :: 13 : a. 15 b. 16 c. 19
49. T. H. Huxley : Darwin :: Adam Smith : a. Emerson b. Galton c. Malthus
50. Rung : Ladder :: Column : a. Arch b. Coliseum c. Colonnade

51. 5:00 P.M. : London :: 2:00 A.M. a. Tokyo b. New York c. Athens
52. Hieroglyphics : Egyptians :: Cuneiform : a. Greeks b. Persians c. Hebrews
53. Whence : Whither :: Origin : a. Source b. Intention c. Destination
54. J. Dewey : Philosophy :: T. Veblen : a. Economics b. Religion c. Medicine
55. Danube : Black Sea :: Euphrates : a. Persian Gulf b. Red Sea c. Caspian Sea

56. Hanging Gardens : Babylon :: Colossus : a. Olympia b. Rhodes c. Ephesus
57. Gavotte : Dance :: Filigree : a. Horse b. Fabric c. Ornament
58. Optics : Physics :: Dialectics : a. Logic b. Language c. Mathematics
59. Martin : Swallow :: Martinet : a. Skylark b. Metronome c. Disciplinarian
60. Set : Set :: Rose : a. Raised b. Risen c. Rise

61. Notre Dame : Cathedral :: Nostradamus : a. Prophet b. Temple c. Nostrum
62. Combustible : Inflammable :: Volatile : a. Voluble b. Slightly c. Inviolate
63. Toxicology : Poisons :: Numismatics : a. Coins b. Fossils c. Guns
64. Noxious : Injurious :: Salacious : a. Salable b. Delicious c. Obscene
65. Octet : Octahedron :: Sextet : a. Cube b. Sexton c. Polyhedron

66. Hippocrates : Galen :: Aeschylus : a. Euripides b. Pericles c. Heraclitus
67. Syntax : Grammar :: Prosody : a. Versification b. Prose c. Orthography
68. Marx : Hegel :: Aquinas : a. Luther b. Aristotle c. Erasmus
69. Maoris : New Zealand :: Ainus : a. China b. India c. Japan
70. Naive : Sophisticated :: Ingenuous : a. Candid b. Artful c. Inventive

71. Parquetry : Wood :: Cloisonné : a. Canvas b. Fretwork c. Enamel
72. Peculiar : Distinctive :: Untoward : a. Unfavorable b. Unexpected c. Fortuitous
73. Taxonomy : Biology :: Etymology : a. Zoology b. Philosophy c. Geology
74. Utopia : Thomas More :: New Atlantis : a. Mill b. Wells c. Bacon
75. Earth : Mars :: Saturn : a. Jupiter b. Uranus c. Neptune

PLEASE DO NOT TURN THE PAGE UNTIL YOU ARE TOLD TO DO SO.

Appendix C – ATTITUDE-INTEREST ANALYSIS TEST

You are asked to cooperate seriously and carefully in answering the items in this booklet. This is not an intelligence test. We want to find out something about the attitudes and interests of people in relation to their occupations, their home situations, and their hobbies. The items in this booklet have been selected by actual trial out of several thousand. More than 4,000 persons of different ages, occupations, and schooling have cooperated in answering the following questions. We are trying to accumulate sufficient returns to discover what the actual standards of response are. Your answers are needed to help do this. Please answer all questions as indicated below. Please do not omit any of the items. All of the information is important.

Do not look at other parts of the booklet until you are ready to begin the test. When you are ready, turn at once to Exercise 1. Read the instructions carefully. Please do not make any marks on this test booklet. Fill out the heading on the answer sheet before starting the test. Then go right on to the exercise itself. Work as rapidly as you can. As soon as you have finished Exercise 1 go right on to Exercise 2, then Exercise 3, and so on until you have finished the booklet. In each case read the directions with care, and work the exercise as rapidly as you can.

DO NOT TURN PAGE UNTIL YOU ARE GIVEN DIRECTIONS TO DO SO.

EXERCISE I

DIRECTIONS: Look at the word in capital letters, then look at each of the four words which follow it.

Sample:

A. HORSE - a. cow b. hay c. race d. swim

Choose the word that seems to you to go best or most naturally with HORSE; that is, the word that HORSE tends most to make you think of. Blacken the appropriate space on the answer sheet.

Second example:

B. AUTO - a. danger b. gears c. machine d. ride

Choose the word that seems to go best or most naturally with AUTO; the word that AUTO tends most to make you think of. Look at each of the words in the list below. In each case, choose the word that goes best or most naturally with the one in capitals; the word it tends most to make you think of. Work rapidly; do not think long over any one.

1.	POLE	a. barber b. cat c. North d. telephone
2.	DATE	a. appointment b. dance c. fruit d. history
3.	BAR	a. drink b. prisoner c. sand d. stop
4.	SHARP	a. bright b. flat c. knife d. pin
5.	TRUNK	a. baggage b. elephant c. travel d. tree
6.	ORDER	a. buy b. command c. neat d. quiet
7.	CASE	a. bottles b. container c. doctor d. grammar
8.	POST	a. fence b. gate c. letter d. mail
9.	TENDER	a. kind b. loving c. meat d. sore
10.	JACK	a. cards b. money c. tool d. toy
11.	TRAIN	a. engine b. gown c. travel d. whistle
12.	DRAW	a. blood b. bridge c. pencil d. picture
13.	BRACE	a. bit b. pair c. strap d. support
14.	FLY	a. airplane b. bird c. nasty d. travel
15.	BOND	a. love b. paper c. security d. tie
16.	PASS	a. car b. mountain c. over d. subject
17.	RAIN	a. clouds b. umbrella c. weather d. wet
18.	BOOK	a. cover b. paper c. print d. read
19.	PURE	a. good b. milk c. water d. white
20.	MOON	a. light b. month c. night d. round

EXERCISE I cont'd.

21.	FLESH	a. blood b. color c. meat d. soft
22.	DANGER	a. accident b. caution c. death d. escape
23.	MODEST	a. bashful b. good c. nice d. shy
24.	FRESH	a. cool b. flirt c. meat d. stale
25.	COLOR	a. black b. blind c. blue d. shade
26.	PICNIC	a. fun b. hike c. sandwich d. Sunday
27.	WEDDING	a. bride b. happiness c. marriage d. ring
28.	DUTY	a. God b. honor c. soldier d. work
29.	GARDEN	a. flower b. fruit c. vegetable d. weeds
30.	EMBRACE	a arms b. lover c. mother d. sin
31.	HOME	a. expenses b. happiness c. house d. sleep
32.	BLUSH	a. red b. rose c. shame d. smile
33.	BABY	a. cry b. darling c. infant d. mother
34.	FELLOW	a. boy b. friend c. good d. pal
35.	CHEAT	a. cards b. clerk c. crook d. unfair
36.	ENJOY	a. food b. happiness c. jolly d. laugh
37.	DEVIL	a. dare b. evil c. hell d. tempt
38.	JEALOUS	a. angry b. green c. lover d. women
39.	DIMPLE	a. baby b. cheek c. hole d. knee
40.	KNIGHT	a. armor b. brave c. Ivanhoe d. man
41.	LETTER	a. love b. news c. paper d. stamp
42.	CELLAR	a. basement b. dark c. furnace d. vegetables
43.	TRUE	a. edge b. good c. soldiers d. story
44.	DESPISE	a. coward b. dirt c. dislike d. flirt
45.	TWILIGHT	a. dark b. dusk c. morning d. sunset
46.	FACE	a. enemy b. powder c. pretty d. wash
47.	SPOON	a. fork b. pet c. silver d. soup
48.	CHEEK	a. blush b. girl c. nerve d. pink
49.	WORSHIP	a. church b. God c. hero d. Sunday
50.	LONGING	a. absence b. child c. home d. success
51.	SACRIFICE	a. cards b. kill c. money d. mother
52.	MARRIAGE	a. children b. divorce c. happy d. licence
53.	RULE	a. command b. footrule c. games d. obey
54.	BRAVE	a. fight b. honor c. protect d. soldier
55.	FLOWER	a. fields b. fragrant c. vase d. violet
56.	FAMILY	a. brother b. kind c. quarrel d. sister
57.	SIXTEEN	a. age b. foolish c. number d. years
58.	ANGEL	a. death b. Gabriel c. good d. heaven
59.	VAIN	a. peacock b. proud c. impossible d. useless
60.	MACHINE	a. engine b. Ford c. ride d. sew

EXERCISE II

In each sentence choose the word that makes the sentence true

Sample A.

The number of provinces in Canada is a. 5 b. 7 c. 9 d. 10
d. 10 is the correct answer. Work as rapidly as you can.

SKIP those you do not know.

61. Marigold is a kind of a. fabric b. flower c. grain d. stone
62. Things cooked in grease are a. boiled b. broiled c. fried d. roasted
63. The Yale is a kind of a. hammer b. lock c. screen d. wrench
64. We should drink tea from the a. cup b. saucer c. spoon
65. Pongee is a kind of a. cloth b. drink c. flower d. game

66. The earth moves around the sun in a. 7 days b. 30 days c. 180 days d. 365 days
67. A stately dance of colonial days was the a. minuet b. polka c. two-step d. waltz
68. One must run fast in a. fruit basket b. jackstones c. tin-tin d. wood-tag
69. Beethoven is known as a a. composer b. painter c. poet d. singer
70. The number of players on a baseball team is a. 7 b. 9 c. 11, d. 13

71. Eggs are best for us when a. deviled b. fried c. hard-boiled d. soft-boiled
72. A loom is used for a. cooking b. embroidering c. sewing d. weaving
73. Peat is used for a. fuel b. pavement c. plaster d. roadmaking
74. Marco Polo was a famous a. king b. philosopher c. traveller d. warrior
75. Tokyo is a city of a. China b. India c. Japan d. Russia

76. Daffodils are grown from a. bulbs b. cuttings c. seeds d. shoots
77. The baby found in the bulrushes was a. Jacob b. Jesus c. Moses d. Paul
78. The boomerang is an a. animal b. plant c. tool d. weapon
79. Mennehaha means a. falling leaves b. laughing waters c. running brooks d. whispering pines
80. A correct expression is a. I have dove b. I dived c. He dove

81. About A.D. 1750 men's sleeves had a. bands b. lace-ruffles c. stiff cuffs d. stripes
82. A food with much the same food substance as rice is a. beans b. peas c. meat d. potatoes
83. A shilling is worth about a. 10 cts. b. 50 cts. c. $1.00 d. $5.00
84. Punch and Judy are a. artists b. dancers c. musicians d. puppets
85. The Erie Canal is in a. Canada b. Ohio c. New-York d. Pennsylvania

EXERCISE II cont'd..

86. Red goes best with a. black b. lavender c. pink d. purple
87. Baby gets its first tooth at about a. 6 mos. b. 12 mos. c. 15 mos. d. 18 mos.
88. The mossy side of a tree is usually on the a. east b. north c. south d. west
89. Turpentine comes from a. coal b. petroleum c. trees d. whales
90 The Madonna is a favorite subject for a. music b. paintings c. poetry d. stories

91. The chief cause of the tides is the attraction of the a. moon b. planets c. sun d. stars
92. The proportion of the globe covered by water is about a. 1/8 b. 1/4 c. 1/2 d. 3/4
93. The turquoise is a. blue b. red c. white d. yellow
94. A plant breathes chiefly through its a. bark b. leaves c. roots d. twigs
95. Mica is an a. explosive b. food c. mineral d. vegetable

96. Blue clashes worst with a. brown b. gray c. pink d. purple
97. A dinner hostell seats the guest of honor at her a. left b. opposite c. right
98. A buffet is used for a. books b. clothes c. dishes d. food
99. Shinny is played with a. bats b. clubs c. nets d. racquets
100 When water freezes it a. contracts b. expands c. does neither

101. The Roman numeral C equals a. 50 b. 100 c. 500 d. 1000
102. Some think "moon over the right shoulder" means a. death b. rain c. sickness d. wish fulfillment
103. The amethyst is a. green b. purple c. white d. yellow
104. Ruth and Naomi are known for their a. devotion b. hatred c. pity d. rivalry
105. The length of a brick is a. 6 in. b. 8 in. c. 10 in. d. 12 in.

106. The number of Abou Ben Adhem's visions was a. 1 b. 2 c. 4 d. 6
107. "Menen's" is the name of a. cold cream b. perfume c. collar d. talcum
108. Barometers are used to measure a. airpressure b. heat c. humidity d. rainfall
109. Lobo was the name of a a. bear b. crow c. fox d. wolf
110. "Charades" is a a. running game b. game of chance c. guessing game d. kissing game

111. The number of ordinary steps in a mile is about a. 1,000 b. 2,000 c. 5,000 d. 10,000
112. "Peter Pan" was written by a. Barrie b. Kipling c. Mark Twain d. Stevenson
113. Babies should be weaned at about a. 3 mos. b. 6 mos. c. 12 mos. d. 2 yrs.
114. The altitude record for airplanes is about a. 10,000 ft. b. 20,000 ft. c. 40,000 ft. d. 60,000 ft
115. Limestone originated from a. granite b. marble c. sand d. shells

EXERCISE II cont'd

116. An animal that suckles its young is the a. alligator b. shark c. snake d. whale

117. A birthright was sold for a mess of pottage by a. Cain b. Esau c. Isaac d. Judas

118. Beam scales illustrate the principle of a. buoyancy b. elasticity c. leverage d. magnetism

119. A character in "David Copperfield" is a. Betty b. Uriah Heep c. Sinbad d. Oliver Twist

120. "Nevermore" was spoken by a a. general b. parrot c. raven d. woman

121. A famous portrait painter was a. Rosa Bonheur b. Mozart c. Reynolds d. Rubens

EXERCISE III

Below is a list of things things that sometimes cause anger. After each thing mentioned choose VM, M, L or N to show how much anger it causes you. Vm means VERY MUCH; M means MUCH; L means A LITTLE; N means NONE.

		a.	b.	c.	d.
122.	Being blamed for something you have not done	VM	M	L	N
123.	Being called lazy	VM	M	L	N
124.	Being called stupid	VM	M	L	N
125.	Being called a thief	VM	M	L	N
126	Being deceived by a supposed friend	VM	M	L	N
127.	Being disturbed when you want to work	VM	M	L	N
128.	Being snubbed by an inferior	VM	M	L	N
129.	Being unexpectedly slapped on the back as joke	VM	M	L	N
130	Hearing someone make fun of your clothes	VM	M	L	N
131.	Hearing your political views ridiculed	VM	M	L	N
132.	Seeing boys make fun of old people	VM	M	L	N
133.	Seeing an honest official thrown out of office by politicians	VM	M	L	N
134.	Seeing a person laugh at a cripple	VM	M	L	N
135.	Seeing people disfigure library books	VM	M	L	N
136.	Seeing someone cheat in an examination	VM	M	L	N
137.	Seeing someone trying to discredit you with your employer	VM	M	L	N
138	Seeing someone laugh when a blind man runs into an obstacle	VM	M	L	N

EXERCISE III cont'd..

Below is a list of things that often cause fear. After each thing mentioned choose VM, M, L or N to indicate how much fear it causes you. Be honest and admit all the fears you have. Fears are not disgraceful.

VM means VERY MUCH; M means MUCH; L means A LITTLE; N means NONE.

		a.	b.	c.	d.
139.	Automobiles	VM	M	L	N
140	Being lost	VM	M	L	N
141.	Being in a closed room	VM	M	L	N
142.	Becoming deaf or blind	VM	M	L	N
143.	Bulls	VM	M	L	N
144.	Burglars	VM	M	L	N
145.	Contagious diseases	VM	M	L	N
146.	Deep water	VM	M	L	N
147.	End of the world	VM	M	L	N
148.	Floods	VM	M	L	N
149.	Garter snakes	VM	M	L	N
150.	Graveyards	VM	M	L	N
151.	Heart trouble	VM	M	L	N
152.	Insects	VM	M	L	N
153.	Lightning	VM	M	L	N
154.	Negroes	VM	M	L	N
155.	Pain	VM	M	L	N
156.	Punishment in the next world	VM	M	L	N
157.	Thunder	VM	M	L	N
158.	Windstorms	VM	M	L	N

Below is a list of things that sometimes cause disgust. After each thing mentioned choose VM, M, L or N to indicate how much disgust it causes you.

VM means VERY MUCH; M means MUCH; L means A LITTLE; N means NONE.

		a.	b.	c.	d.
159.	An unshaven man	VM	M	L	N
160.	a butcher shop	VM	M	L	N
161.	A drunken man	VM	M	L	N
162.	Crooked teeth	VM	M	L	N
163.	Food stains on clothing	VM	M	L	N
164.	Foul language	VM	M	L	N
165.	Gum chewing	VM	M	L	N

EXERCISE III cont'd..

		a.	b.	c.	d.
166.	Mushy food in your mouth	VM	M	L	N
167.	Offensive breath	VM	M	L	N
168.	Pimples	VM	M	L	N
169.	Sagging socks on a man	VM	M	L	N
170	Seeing a woman smoking	VM	M	L	N
171.	Sight of slimy water	VM	M	L	N
172.	Smell of decaying fish	VM	M	L	N
173.	Soiled or ragged fingernails	VM	M	L	N
174.	Spitting in public	VM	M	L	N
175.	Untidy clothes	VM	M	L	N
176.	Word "Gent" used for gentleman	VM	M	L	N

Below is a list of things that sometimes arouse pity. After each thing mentioned choose VM, M, L or N to indicate how much pity it arouses in you.

VM means VERY MUCH; M means MUCH; L means A LITTLE; N means NONE.

		a.	b.	c.	d.
177.	A bee that is drowning	VM	M	L	N
178.	A dog that must be killed for biting people	VM	M	L	N
179.	A man who is cowardly and can't help it	VM	M	L	N
180.	An insane person				
181.	An old person with a fatal disease	VM	M	L	N
182.	An orphan girl	VM	M	L	N
183.	Overworked horses	VM	M	L	N
184.	Overworked children	VM	M	L	N
185.	A fly caught on sticky paper	VM	M	L	N
186.	An underfed child	VM	M	L	N
187.	Very old people	VM	M	L	N
188.	A wounded deer	VM	M	L	N
189.	A baby bird whose mother is dead	VM	M	L	N
190.	A wounded soldier who must beg for a living	VM	M	L	N
191.	A young person totally paralyzed	VM	M	L	N

Below is a list of acts of various degrees of badness. After each thing mentioned choose a., b., c., or d. to show how bad you think it is.

a. means EXTREMELY BAD b. means DECIDEDLY BAD c. means SOMEWHAT BAD
d. means NOT REALLY BAD.

192.	Picking flowers in a public park	a	b	c	d
193.	Stealing a ride on a truck	a	b	c	d
194.	Telling a lie to avoid punishment	a	b	c	d
195.	Whispering in school	a	b	c	d

EXERCISE III cont'd..

196.	Boys teasing girls	a	b	c	d
197.	Making fun of cripples	a	b	c	d
198.	Using slang	a	b	c	d
199.	Breaking windows	a	b	c	d
200.	Boys smoking before they are 21	a	b	c	d
201.	Indulging in "petting"	a	b	c	d
202.	Moderate drinking	a	b	c	d
203.	Excessive drinking	a	b	c	d
204.	Putting tacks on teacher's chair	a	b	c	d
205.	Swiping fruit out of orchards	a	b	c	d
206.	Laziness	a	b	c	d
207.	Going to bed without saying your prayers	a	b	c	d
208.	Not brushing your teeth	a	b	c	d
209.	Boys fighting	a	b	c	d
210.	Being a slacker in time of war	a	b	c	d
211.	Boy running away from home	a	b	c	d
212.	Neglecting to study your lesson	a	b	c	d
213.	Being a Bolshevik	a	b	c	d
214.	Drinking a great deal of coffee and tea	a	b	c	d
215.	Being cross to your brother or sister	a	b	c	d
216.	Shooting rabbits just for fun	a	b	c	d
217.	Having fits of temper	a	b	c	d
218.	Insulting the defenseless	a	b	c	d

In each comparison below choose a., b., or c. to show how well you like the things mentioned.

Choose a if you like the first thing better;
Choose b if you like the second thing better;
Choose c if you have the same liking for both.

219. a. make plans b. carry out plans c. same liking
220. a. work involving many details. b. work involving few details c. same liking

221. a. interesting work with small income b. uninteresting work with large income c. same liking
222. a. give a report in writing b. give a report verbally c. same liking
223. a. work with men b. work with women c. same liking
224. a. an auto with scruffy paint but excellent motor b. an auto with fresh paint but only fairly good motor c. same liking
225. a. live in the country b. live in the city c. same liking

EXERCISE IV

For each occupation below, ask yourself: would I like that work or not? If you would like it, choose a. for like. If you would dislike it, choose b. for dislike. If you would neither like nor dislike it, choose c. for neither like nor dislike. In deciding on your answer; think only of the kind of work. Don't consider the pay. Imagine that you have the ability to do the work, that you are the right age for it, and that it is equally open to men and women.

Don't stop to think long; answer fairly quickly.

		Like	Dislike	Neither
226.	Architect	a	b	c
227.	Chef or cook	a.	b	c
228.	Auto racer	aa	b	c
229.	Librarian	a	b	c.
230.	Building Contractor	a	b	c
231.	Detective	a	b	c
232.	Nurse	a	b	c
233.	Private secretary	a	b	c
234.	Journalist	a	b	c
235.	Forest Ranger	a	b	c
236.	Dairyman	a	b	c
237.	Dressmaker	a	b	c
238.	Florist	a	b	c
239.	Stock breeder	a	b	c
240.	Optician	a	b	c
241.	Social worker	a	b	c
242.	Music teacher	a	b	c
243.	Clerk in a store	a	b	c
244.	Singer	a	b	c
245.	Preacher	a	b	c
246.	Novelist	a	b	c
247.	Soldier	a	b	c
248.	Draftsman	a	b	c
249.	Artist	a	b	c
250.	Bookkeeper	a	b	c

Do you like or dislike these people		Like	Dislike	Neither
251.	Men with beards	a	b	c
252.	Babies	a	b	c
253.	Infidels	a	b	c
254.	People with loud voices	a	b	c
255.	Argumentative people	a	b	c

EXERCISE IV cont'd.

Do you like or dislike these people? cont'd

		Like	Dislike	Neither
256.	Very forgiving people	a	b	c
257.	Very quiet people	a	b	c
258.	People who spend freely	a	b	c
259.	People with gold teeth	a	b	c
260.	Tall women	a	b	c
261.	Men who take the lead	a	b	c
262.	Mannish women	a	b	c

Do you like or dislike these?

		Like	Dislike	Neither
263.	Charlie Chaplin	a	b	c
264.	Social problem movies	a	b	c
265.	Movie love scenes	a	b	c
266.	Poetry	a	b	c
267.	Detective stories	a	b	c
268.	Stories of home life	a	b	c
269.	Adventure stories	a	b	c
270.	Comic supplements	a	b	c
271.	Radio magazines	a	b	c
272.	Chemistry	a	b	c
273.	Dramatics	a	b	c
274.	Ancient languages	a	b	c
275.	Civics	a	b	c
276.	Spelling	a	b	c
277.	Hunting	a	b	c
278.	Skating	a	b	c
279.	Horseback riding	a	b	c
280.	Hopscotch	a	b	c
281.	Dare base	a	b	c
282.	Drop the handkerchief	a	b	c
283.	Chess	a	b	c
284.	Charades	a	b	c
285.	Collecting flowers	a	b	c
286.	Cooking	a	b	c
287.	Studying lessons	a	b	c
288.	Repairing a door latch	a	b	c
289.	Parties and socials	a	b	c
290.	Being with one another	a	b	c

EXERCISE IV cont'd..

Do you like or dislike these people? cont'd

		Like	Dislike	Neither
291.	Strict Sunday laws	a	b	c
292.	Pet cats	a	b	c
293.	Near-beer	a	b	c
294.	Coco-cola	a	b	c
295.	Cheese	a	b	c
296.	Candies	a	b	c

After each book you have read, choose a. for like, b. for dislike, c. for neither like or dislike.

SKIP those you have not read.

		Like	Dislike	Neither
297.	Robinson Crusoe, by Daniel Defoe	a	b	c
298.	Lorna Doone, by Richard D. Blackmore	a	b	c
299.	Through the Looking Glass, by Lewis Carroll	a	b	c
300.	Westward Ho, by Charles Kingsley	a	b	c
301.	Daddy Long Legs, by Jean Webster	a	b	c
302.	Peter Pan and Wendy, by J. M. Barrie	a	b	c
303.	Huckleberry Finn, by Mark Twain	a	b	c
304.	Rip van Winkle, by Washington Irving	a	b	c
305.	The Wonder Book, by Nathaniel Hawthorne	a	b	c
306.	Bird's Christmas Carol, by Kate Douglas Wiggin	a	b	c
307.	Rebecca of Sunnybrook Farm, by Kate Douglas Wiggin	a	b	c
308.	Christmas Carol, by Charles Dickens	a	b	c
309.	The Man Without a Country, by Edward Everett Hale	a	b	c
310.	Little Men, by Louisa Alcott	a	b	c
311.	The Secret Garden by Frances Hodgson Burnett	a	b	c
312.	Captains Courageous, by Rudyard Kipling	a	b	c
313.	Little Lord Fauntleroy, by Frances Hodgson Burnett	a	b	c
314.	Boy's life of Theodore Roosevelt by Herman Hagedorn	a	b	c
315.	Gulliver's Travels, by Jonathan Swift	a	b	c
316.	Biography of a Grizzly, by Ernest Seton-Thompson	a	b	c
317.	Evangeline, by Henry W. Longfellow	a	b	c
318.	Tales from Shalespeare, by Charles Lamb	a	b	c
319.	Adventures of Sherlock Holmes, by Conan Doyle	a	b	c

EXERCISE IV cont'd.:

Suppose you were an artist, what would you like to draw?

		Like	Dislike	Neither
320	Fruits	a	b	c
321.	Children	a	b	c
322.	Horses	a	b	c
323.	Clouds	a	b	c
324.	Cats	a	b	c
325.	Flowers	a	b	c
326.	Tigers	a	b	c
327.	Ships	a	b	c

Suppose you were a newspaper reporter, what would you like to write about, or report?

		Like	Dislike	Neither
328.	Accidents	a	b	c
329.	Sporting news	a	b	c
330.	Musical events	a	b	c
331.	Theatrical events	a	b	c
332.	News oddities	a	b	c
333.	Commercial news	a	b	c

If you had two years to travel, with plenty of money, what would you like to see and do?

		Like	Dislike	Neither
334.	Visit Holland	a	b	c
335.	Hunt lions in Africa	a	b	c
336.	Spend a day in Westminster Abbey	a	b	c
337.	See London Bridge	a	b	c
338.	Visit many famous battlegrounds	a	b	c
339.	Visit many manufacturing plants	a	b	c
340.	See how people prepare their food	a	b	c
341.	Spend a year on a sailing boat	a	b	c
342.	Study social customs	a	b	c
343.	See how criminals are treated	a	b	c
344.	Learn about various religions	a	b	c

EXERCISE V

Answer each question as truthfully as you can by choosing a. for YES, b. for NO.

		YES	NO
345.	Do you like most people you know	a	b
346.	Did you ever have imaginary companions?	a	b
347.	Do people often say you are too noisy?	a	b
348.	Do you rather dislike to take your baths?	a	b
349.	Have you been bossed too much for your own good?	a	b
350.	Do you nearly always prefer for someone else to take the lead?	a	b
351.	Do you feel yourself to be lacking in self-control?	a	b
352.	Are you extremely careful about your manner of dress?	a	b
353.	Do you work mostly by fits and starts?	a	b
354.	Do you shrink from facing a crisis or difficulty?	a	b
355.	Are you careful of your personal belongings?	a	b
356.	Do you worry much over possible misfortunes?	a	b
357.	Are you much embarassed when you make a grammatical mistake?	a	b
358.	Are you worried when you have an unfinished job on your hands?	a	b
359.	Have you ever kept a diary?	a	b
360.	Do you like to go to parties, dances or other social affairs?	a	b
361.	Do you ever feel that you are abut to "go to pieces"?	a	b
362.	Are you often afraid of the dark?	a	b
363.	Have you often fainted away?	a	b
364.	Can you usually sit still without fidgeting?	a	b
365.	Do you usually enjoy your meals?	a	b
366.	Have you the habit of biting your fingernails?	a	b
367.	As a child, were you extremely disobedient?	a	b
368.	Do you ever dream of robbers?	a	b
369.	Do people ever say that you talk too much?	a	b
370.	Do you ever have the same dream over and over?	a	b
371.	Do people nearly always treat you right?	a	b
372.	Were you ever expelled from school, or nearly expelled?	a	b
373.	Have you ever been punished unjustly?	a	b
374.	Do you often get cross over little things?	a	b
375.	Does it make you angry for people to hurry you?	a	b

		YES	NO
376.	Can you stand as much pain as others can?	a	b
377.	Is it easy for you to get up as soon as you wake?	a	b
378.	Would you like to wear expensive clothes?	a	b
379.	Do you feel tired a good deal of the time?	a	b
380.	Do you ever walk in your sleep?	a	b
381.	Do you hear easily when spoken to?	a	b
382.	Are you often frightened in the middle of the night?	a	b
383.	Have you found school a hard place to get along in?	a	b
384.	Can you do good work while people are looking at you?	a	b
385.	Do you feel like jumping off when you are on a high place?	a	b
386.	Do you always remember to brush your teeth?	a	b

APPENDIX D

Problems as Numbered in the Problem-Solving Measure

1. A student bought a car for $600, sold it for $700, bought it back again for $800 and sold it again for $900. How much money did the student make?
2. An unknown individual bought a bicycle for $15 and gave in payment a cheque for $25. The dealer went to a neighborhood store and cashed the cheque. The stranger received $10 change, mounted the bicycle, and disappeared. The cheque bounced and the dealer had to make it good. The bicycle cost the dealer $11. How much money did the dealer lose all together?
3. How can you measure out exactly six quarts of liquid when you have only a four-quart container and a nine-quart container to measure with? (Liquid is in a large barrel.)
4. Suppose you are interested in how fast a rumor spreads through the cafeteria. One student can tell another student the news in 3 minutes. Every new student can tell one other student the news in 3 minutes. If one student gets a piece of infor-

mation it takes one hour for the news to get all around the cafeteria. How long will it take for a rumor to cover the whole cafeteria if 2 students hear it at the same time?

5. Students A, B, and C have $36. B has twice as much as C, and A has as much as B and C together. How much money does A have?

6. If 7 students can do a job in 21 days, how many days will it take 3 students to do the same job?

7. A snail starts at the bottom of a well 12 feet deep and crawls up 4 feet each day. Each night, however, the poor thing slips back 3 feet. How long will it take the snail to reach the top of the well?

8. A decorator ordered 1,000 yards of drapery material. There was enough to provide four yards for each long drape and two yards for each short drape that the decorator had on order. All together there were orders for 296 drapes. How many long drapes and how many short drapes had been ordered?

APPENDIX E

Post-Experimental Inquiry

Please indicate your ratings of the test by a check at the appropriate point on the scale.

1. How did you perceive the experimenter?

1	2	3	4	5
Friendly				Cold

2. How did you perceive the experimenter?

1	2	3	4	5
Efficient				Incapable

3. To what extent did you enjoy participating in the experiment?

1	2	3	4	5
Not at all				Very much

4. How difficult were the first four problems?

1	2	3	4	5
Very easy				Very difficult

5. How concerned were you with performing well on the first four problems?

1	2	3	4	5
Not at all				Very much so

6. How difficult were the second four problems?

1	2	3	4	5
Very easy				Very difficult

7. How concerned were you with performing well on the second four problems?

1	2	3	4	5
Not at all				Very much so

8. Did your motivation differ during the performance of the first four problems and the second four problems?

1	2	3	4	5
Not at all				Very much

9. Under which condition did you feel more motivated?

The First ☐ The Second ☐

10. Please indicate below what you think this research is about.

APPENDIX F

Problem-Solving Scores

		Noncompetitive	Competitive
Group 1	Loyola/Same-Sex/Males		
		0	4
		0	2
		1	1
n = 7		1	4
		1	0
		0	0
		2	0
Group 2	Loyola/Same-Sex/Females		
		1	1
		2	1
n = 5		0	4
		0	0
		2	1
Group 3	Loyola/Mixed-Sex/Males		
		2	3
		1	2
n = 5		2	2
		0	3
		0	2
Group 4	Loyola/Mixed-Sex/Females		
		2	1
		1	2
n = 5		0	1
		1	3
		2	2
Group 5	Dawson/Same-Sex/Males		
		1	1
		1	0
		0	1
n = 7		2	0
		1	3
		0	2
		1	3

	Noncompetitive	Competitive
Group 6	Dawson/Same-Sex/Females	
	3	0
	1	1
	1	1
	2	0
n = 9	1	0
	1	0
	2	3
	0	0
	1	3
Group 7	Dawson/Mixed-Sex/Males	
	2	1
	0	2
	2	2
	1	2
n = 9	2	1
	1	0
	1	0
	1	0
	0	3
Group 8	Dawson/Mixed-Sex/Females	
	2	3
	1	1
	2	0
	2	0
n = 9	1	0
	1	0
	1	0
	1	1
	1	1