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Adequacy of conflict resolution and its relationship to general problem-solving ability, performance under stress, and selected emotional factors.

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ADEQUACY OF CONFLICT RESOLUTION AND ITS RELATIONSHIP TO GENERAL PROBLEM-SOLVING ABILITY, PERFORMANCE UNDER STRESS, AND SELECTED EMOTIONAL FACTORS

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In 1935, Lewin defined conflict as the "opposition of approximately equally strong field forces" (Lewin, 1935, p. 88) and delineated four different types of conflict, specifying the now-familiar approach-approach, approach-avoidance, avoidance-avoidance and double approach-avoidance conflicts. These types of conflicts and how they are resolved have been investigated within various theoretical frameworks and using a variety of experimental paradigms. One line of experimentation, pioneered by Hovland and Sears (1938), has been the study of cognitive-motor conflict. In their studies, Ss were told to move a pencil as quickly as possible to the corner of a paper in which a green light appeared, and away from the corner in which a red light appeared. A number of non-conflict trials with one light were first presented; conflict was then introduced by flashing more than one light. Approach-approach conflict ("Type I") consisted of a green light in each corner; approach-avoidance conflict ("Type II") of a red and a green light in the same corner; and avoidance-avoidance conflict ("Type III") of a red light in each corner.

Hovland and Sears found that approach-approach conflict

was resolved predominantly by a single response to one of the goals, with the second most frequent response a double one to both of the goals. The most frequent response to approach-avoidance conflict was a double response, with blocking--or failure to leave the starting point--the second most frequent. In avoidance-avoidance conflict, blocking was the predominant response, with compromise--response termination at some point between the start and the goals--the second most frequent.

In a second series of experiments, Sears and Hovland (1941) investigated avoidance-avoidance conflict and systematically varied the relative strengths of the conflicting responses by: (a) varying amount of practice; (b) combining shock punishment with one of the two lights, both of the lights, or neither of the lights. Again they found a high incidence of blocking, with the probability of blocking increasing as the strengths of the conflicting responses were equalized.

Although Hovland and Sears' results are interesting, they fail to provide unambiguous information about the adequacy of resolution of the different types of conflict. Thus "blocking," the most frequent response to avoidance-avoidance conflict and the second most frequent response to approach-avoidance conflict, although seemingly an

"inadequate" resolution, is not necessarily so. Since Ss were not required by the instructions to leave the starting point, some of those who remained there may not have been "freezing," but rather behaving rationally, maximizing the distance from the approach-avoidance conflict in one corner (Type II) or from the two avoidance goals (Type III).

This criticism was made by Epstein and Smith (1967), who carried out a study similar to those of Hovland and Sears, but who obtained a definitive measure of blocking by informing Ss that they were required to leave the starting point, and who considered adequacy as well as mode of resolution of each of the types of conflict.

Epstein and Smith assumed that: "(a) conflicts tend to be resolved with the most appropriate responses under the circumstances provided; and (b) the basic types of conflict vary in the degree to which they disrupt cognitive functioning" (p. 265). From these assumptions they generated the following hypotheses:

1) Approach-approach conflict elicits predominantly single and double responses (since these are the most appropriate responses).
2) Approach-avoidance conflict, when the avoidance is stronger than the approach incentive at the goal, elicits predominantly single responses to the

opposite corner of the conflicted goal.

3) Avoidance-avoidance conflict elicits predominantly compromise responses which maximize the distances from negative goals.

4) Inadequacy of response, whether measured by mode of resolution, time, speed, or errors, increases in the following order of conflict types: approach-approach, approach-avoidance, avoidance-avoidance (p. 265).

The hypothesis that the most appropriate mode of resolution is the predominant one was supported for approach-approach and approach-avoidance conflicts, but not for avoidance-avoidance conflict, in which a single response to one of the negative goals predominated. Contrary to Hovland and Sears, who found blocking to be the predominant response to avoidance-avoidance conflict, this study showed only fourteen percent of Ss making the blocking response. The hypothesis that approach-approach conflict is the least disruptive conflict and avoidance-avoidance the most disruptive was confirmed.

A second study by Smith and Epstein (1967), designed to investigate the influence of incentive (money) on adequecy of conflict resolution, closely replicated their previous findings and also indicated that while incentive

had no effect on mode of conflict resolution, it influenced speed and accuracy of response.

The studies reviewed above investigated the general relationships between type of conflict and mode of resolution. But what about individual differences in resolution of conflict? What factors are responsible for adequate versus inadequate resolution? Although each of the above studies showed a predominant mode of resolution to each type of conflict, there were still many subjects who did not conform to the majority rule. Even in the relatively "easy" approach-approach conflict situation, in which two positive goals were presented and the individual could reach one or even both, there were some subjects who reached neither, manifesting blocking or compromise behavior. Also, the majority of resolutions of avoidance-avoidance conflict were inadequate, rather than adequate.

Ringuette (1965) hypothesized that "meaningful relationships" exist between modes of conflict resolution and personality characteristics. Subjects were presented with cognitive-motor conflicts and were grouped on the basis of mode of resolution; then the groups were compared in terms of diagnosis and of scores on the Barron Ego Strength Scale and the Walsh Anxiety and Repression scales.

The modes of resolution considered by Ringuette were:

Compromise--a response terminating between the starting point and the goal(s); Arbitrary--a response to one corner or the other; Equivocation--a response to both corners; and Blocking--no response. He did not, however, consider adequacy of resolution, for he pooled responses to the different conflict types. A response consisting of going to both corners, for example, was labelled "equivocation," regardless of whether it was an "adequate" response to an approach-approach conflict or an "inadequate" response to an avoidance-avoidance conflict. Further, he did not require Ss to leave the starting point; so, as in the Hovland and Sears studies, there is no unambiguous measure of blocking (Epstein and Smith, 1967).

Ringuette's results must be looked at with these methodological flaws in mind. He found, however, that there were significant differences among groups in scores on the Ego Strength scale, with the Compromise Group having a higher score than the Arbitrary and Equivocation Groups, and the Blocking Group having a higher score than the Equivocation Group. There were no differences between the groups on either the Anxiety or Repression scales.

Drawing from this background, the purpose of the present study was to further the investigation of individual differences in the resolution of conflict. Specifically, it explored

adequate versus inadequate modes of conflict resolution and possible factors associated with them.

One hypothesis that can be proposed is that ability to resolve conflicts is simply a function of general problem-solving ability, with high problem-solving ability related to adequate conflict resolution, low problem-solving ability to inadequate conflict resolution. To some extent, the conflict situation may involve a cognitive appraisal of the task at hand and a resultant decision.

Two different types of problem-solving ability might be operating here, however. The first type would be that ability needed for cognitive-motor problem-solving, such as finding the way out of a paper and pencil maze. The second type of problem-solving ability would be manifested in "abstract thinking" tasks, such as numbers series and word analogies. Unlike the more motoric maze-solving, these tasks involve a more mental, abstract kind of problem-solving.

It would be interesting to contrast these two types of problem-solving ability with an ability such as vocabulary skill. Although all three might be considered aspects of "intelligence," vocabulary skill, rather than involving problem-solution, is more a function of simple learning and memory. If there is indeed a relationship between ability to resolve conflicts and problem-solving ability, it would

be fruitful to see whether it is a discrete relationship or whether other aspects of intellectual functioning, such as vocabulary, are also related.

A second hypothesis is that ability to resolve conflicts does not simply reflect general problem-solving ability or intelligence, but rather reflects the ability to solve problems under stress. For the conflict situation, along with its decision-making element, has a time element associated with it---i.e., the conflict must be resolved as quickly as possible. It may be, then, that good resolvers of conflict do not differ from poor resolvers in general problem-solving ability or intellectual functioning, but only in problem-solving or intellectual functioning under stress.

Related to this is the possibility that emotional factors, such as anxiety, are important variables in the resolution of conflict. The clinical relevance of anxiety and hostility warrant their inclusion as possible factors. Also, however, Epstein and Smith (1967) posit that anxiety might be involved in their finding that the predominant response to avoidance-avoidance conflict was an inappropriate single response to one of the negative goals. They base their explanation on Epstein's (1967) analysis of anxiety as "a noxious state produced by a heightened degree of

undirected physiological arousal following the perception of danger," or "unresolved fear." Given this state, any directed motive or action is said to be anxiety-reducing. This accounts for the higher incidence in avoidance-avoidance conflict of movement to the negative goal than of remaining at the starting point, even though the former constitutes an equally inappropriate resolution. It is possible that anxiety is disruptive not only in avoidance-avoidance conflicts, but also, if high enough, in other types of conflict as well.

The present study sought to answer the following questions: To what extent is conflict resolution related to general problem-solving ability? To what extent is conflict resolution related to ability to solve problems under stress? To what extent is conflict resolution related to emotional factors such as anxiety and hostility?

Method

Subjects

Subjects were 100 students in introductory psychology classes at the University of Massachusetts. The performances of all 100 Ss were utilized in looking at the data on general mode and adequacy of conflict resolution. From

this pool of Ss, three groups of 16 Ss each were selected for further analysis. The groups consisted of 16 Ss who adequately resolved all three conflicts; 16 Ss who adequately resolved two conflicts; and 16 Ss who adequately resolved one or no conflicts. The reason for selecting 16 Ss per group was the desire to maintain equal numbers, and there were only 16 Ss who qualified for the first group.[1] The male-female ratio was kept constant across groups by matching the second and third groups with the first group.

Apparatus

The apparatus for the conflict resolution task consisted of a masonite board, 12 x 16 inches, in the center of which was a recessed area which contained a stack of 8½ x 11 inch sheets of paper on each of which was printed the same maze (see Appendix A for the maze). At the upper right and left corners of the board, above the goals of the maze, were a pair of red and white lights. The lights were operated by E with the aid of a control panel which was screened from S's view by a masonite board mounted on the back of the conflict apparatus. Response time was measured to the nearest .01 second with an electric timer. The maze was constructed so that S's line of vision was

[1]Nineteen Ss adequately resolved all conflicts, but the data of three of them was unusable.

directed equally to both goals. Crossways permitted detour responses from one side of the maze to the other.

Procedure

Conflict Resolution: Each S was seen individually and given the following instructions:

> This is a reaction time experiment. I will be measuring both the speed and accuracy of your responses. On the paper before you, there is a system of pathways over which you may move, using any combination you wish. The area outside these pathways is quicksand, and, if you should go into this area, your score will be lowered. You begin each trial at point X, and you want to go to either of the goals, which represent cities. Several conditions will determine your choice. When any of the four lights flash, this indicates that an atom bomb will be dropped at point X, and you had better move away as soon as possible. When a white light flashes above a goal, this signifies that you will receive one million dollars if you get to that city quickly enough. If a red light flashes above a goal, this signifies that an atom bomb will be dropped at that city.
>
> In summary, when any light goes on, you must get away from point X. You are to go toward a white light and away from a red light. Any questions? Remember to move as quickly as possible while remaining within the boundaries.

Each S received 43 trials. Of these, trials 21, 32, and 43 were conflict trials. For the approach-approach conflict, a white light flashed above each of the two goals.

For the approach-avoidance conflict, a red and a white light flashed above one goal. For the avoidance-avoidance conflict, a red light flashed above each of the two goals. The rest of the trials were single, non-conflict, approach or avoidance trials.

For each trial, S began by placing his pencil at point X. The experimenter then simultaneously turned on the lights according to a prearranged design and started the electric timer. Time was stopped and the lights turned off when S finished moving his pencil and indicated that he had completed his response by saying "stop." The experimenter recorded the response time and then went on to the next trial.

Each S received all three types of conflict. Order of presentation of conflict trials was counterbalanced according to a 3 x 3 Latin square. Order of presentation of the single trials was the same for all Ss and was randomized and equal with respect to frequency of approach and avoidance and of left and right positions.

Maze-Solving: Immediately after the conflict resolution task, S was presented with two sets of paper and pencil mazes to solve, with five mazes in each set (see Appendix A). One set was presented under normal, "non-stress" conditions, the other under "stress" conditions. Instructions

for the non-stress set were as follows:

> I am going to present you with a series of mazes, one at a time, and I want you to solve them as quickly as you can and with as few errors as possible. When I say 'ready,' place the point of your pencil at the starting point, and when I tell you to 'begin,' trace your way out of the maze. Speed and accuracy are important, but you will have as much time as you need. Ready? Begin.

The experimenter placed the first maze in front of S, indicating where S was to start, and then simultaneously said "begin" and activated the electric timer. When S had completed the maze, E recorded the time taken to solve it to the nearest .01 second and went on to the second maze.

Instructions for the stress set were as follows:

> Now I have a second series of mazes, and once again I want you to solve them as quickly as possible and with as few errors as possible. But this time, since speed is very important, I'll be telling you at frequent intervals how long you are taking. Remember to find your way out of the mazes as quickly and as accurately as possible. Ready? Begin.

The procedure for this set of mazes was the same as that for the first series. This time, however, in order to induce stress by urgently conveying to S the passage of time while at the same time distracting him from his task, E called out the time which had passed, every five seconds until S had completed the maze (i.e., "five seconds"...

"ten seconds"...etc.)

Order of presentation of the two conditions was counterbalanced, with half of the Ss receiving the non-stress condition first, half receiving the stress condition first. (See Appendix A for instructions when stress was presented first.)

For each S, two scores were derived from this task: total time taken to solve the five mazes in the non-stress set, and total time taken to solve the five mazes in the stress set.

Abstract Thinking: Subjects were tested in a group for this portion of the experiment, as they were for all subsequent portions.[2] They were presented with two tests of abstract thinking, each test made up of numbers series and word analogies pooled from a number of standard tests. (See Appendix A for the test items and their sources.) One test was presented under non-stress conditions, one under stress conditions. For the non-stress condition, the following instructions were given:

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[2]For two-thirds of the Ss, experimentation was carried out in classroom laboratories. For these Ss, the abstract thinking tests immediately followed the maze-solving (with about a ten minute break in between); the abstract thinking tests were in turn followed by the vocabulary tests and questionnaire. The remaining one-third of the Ss were seen in two separate sessions. The first was an individual session in which the conflict resolution and maze-solving tasks were presented. The second session was about one week later and was a group session in which the abstract thinking tests, vocabulary tests, and questionnaire were presented in the same order as for the other Ss.

> When I tell you to begin, put your name on the form, read the directions and complete the items. You will have 12 minutes, which should give you plenty of time to do all the ones you can. Okay, begin.

The time limit of 12 minutes was selected, on the basis of a few pilot Ss, as giving S more than ample time to complete the items. The purpose was to create as little pressure as possible and to allow S to work on all of the problems to the best of his ability.

For the stress condition, instructions were as follows:

> Now I want to see how you perform when speed is a factor. You have a second set of items to complete, but this time you will have only 6 minutes in which to do so. So work as quickly as you can, and at intervals I'll be telling you how much time you have left. Okay, begin.

For this set, E called out the time lapsing and/or remaining every ten to twenty seconds, on a fixed schedule (see Appendix A). The time limit of 6 minutes was selected to create pressure by giving S just barely enough time to complete the items if he worked at his fastest and topmost capacity. Order of presentation of conditions was again counterbalanced (see Appendix A for instructions when stress was presented first.) Each S again received two scores: total number of items correct on each of the two tests.

Vocabulary: Subjects were presented with two vocabulary tests (see Appendix A), one under non-stress conditions

and one under stress conditions. Instructions and procedure were the same as for the tests of abstract thinking; this time, however, the time limits were six minutes and three minutes, respectively. The basis for the selection of these time limits was the same as that for the abstract thinking tests. For the stress condition, time was called out according to a fixed schedule (see Appendix A). Order of presentation of conditions was once again counterbalanced, and scores were again total number of items correct on each of the two tests.

Anxiety and Hostility Questionnaire: As their final task, Ss were given a questionnaire to fill out (see Appendix A), in which they were to rate themselves from one to five on 77 items. The questionnaire contained three anxiety subscales (striated muscle tension, autonomic anxiety, and feelings of insecurity) and two hostility subscales (hostile feelings and rejection of hostility). On each of these five scales, S received a score consisting of the sum of his ratings on the items in that scale. Each S also received an overall anxiety score derived by adding together his scores on the three anxiety scales.

Results

Mode of Conflict Resolution

Five independent categories were used in classifying mode of conflict resolution. In addition, each category had two subscores: a plus sign for adequate resolution and a minus sign for inadequate resolution. The categories were as follows:

1) Single response (S+ or S-) The goal is reached directly, without detour, or with a minimal detour across the short crossway at the center of the maze. An S+ is scored for an approach response to a positive goal and an avoidance response to a negative goal. An S- is scored when approach is to a negative goal or away from a positive goal. In approach-approach conflict, all single responses are +; in approach-avoidance conflict, a single response away from the conflicted goal is +, and to the conflicted goal is -. In avoidance-avoidance conflict, all single responses are -.

2) Double response (Db+ or Db-) Both goals are reached by: (a) going from one goal directly to the other; (b) detouring from one goal to the

other; or (c) returning to the starting point and then proceeding to the other goal. A Db+ can be obtained only in approach-approach conflict.

3) Compromise (C+ or C-) The response does not terminate at a goal, but at some point on the maze between the starting point and a goal point. A C+ could be obtained on avoidance-avoidance conflict by terminating within the middle one-third of the maze, thereby maximizing the distance from the three negative points. All other compromise responses were scored -.

4) Blocking (Bl-) Failure to leave the starting point following the onset of the stimulus.

5) Disorganized (Ds-) No attempt made to remain within the confines of the maze.

In addition to these five independent categories, four non-independent and overlapping categories of Detour were scored:

1) Minimal Detour ($Dt_{min.}$) A detour through the shortest crossway at the center of the maze.

2) Detour to Correct Goal ($Dt_{c.g.}$) Any response which terminates at the correct goal, but which utilizes any of the crossways other than the short center one to reach the goal.

3) Detour to Incorrect Goal ($Dt_{i.g.}$) Any response which terminates at the incorrect goal, but which utilizes any of the crossways other than the short center one to reach the goal.

4) Detour to No Goal ($Dt_{n.g.}$) Any response which utilizes crossways, but does not terminate at a goal.

Table 1 presents mode and adequacy of resolution of nonconflict and conflict trials, and Figure 1 shows percent of adequate solutions. The data on the nonconflict control trials are based upon the single trials immediately preceding each of the three conflict trials, divided by three and rounded to the nearest whole number.

Inspection of Table 1 and Figure 1 shows that, as found by Epstein and Smith (1967), number of adequate solutions decreased in the following order: nonconflict control trials, approach-approach conflict, approach-avoidance conflict, avoidance-avoidance conflict. Predominant mode of resolution was: a single response to one of the positive goals for approach-approach conflict; a single response away from the conflicted goal for approach-avoidance conflict; and a single response to one of the negative goals for avoidance-avoidance conflict.

Table 2 presents the number of Ss who adequately resolved zero, one, two, and three conflicts. The modal

Table 1

Mode and Adequacy of Response

as a Function of Conflict Type

Mode	Conflict Type			
	Nonconflict	Type I	Type II	Type III
S+	98*	64	53	
S-	2	1	26	43
S_{tot}	100	65	79	43
Db+		33		
Db-			4	5
Db_{tot}		33	4	5
C+				35
C-		1	12	13
C_{tot}		1	12	48
Bl-		1	2	4
Ds-			3	
Total +	98	97	53	35
Total -	2	3	47	65
Total	100	100	100	100

*Since there were 100 Ss, entries refer to both number of Ss and percentages.

Table 1 (Continued)

Detour Responses

Mode	Conflict Type			
	Nonconflict	Type I	Type II	Type III
Dt_{minor}	7	8	9	3
(c.g.)	(6)	(8)	(6)	
(i.g.)	(1)		(3)	(3)
(n.g.)				
Dt_{major}	1	2	10	23
(c.g.)				
(i.g.)	(1)	(1)	(4)	(10)
(n.g.)		(1)	(6)	(13)
Dt_{total}	8	10	19	26

Note.--c.g. = correct goal
i.g. = incorrect goal
n.g. = no goal

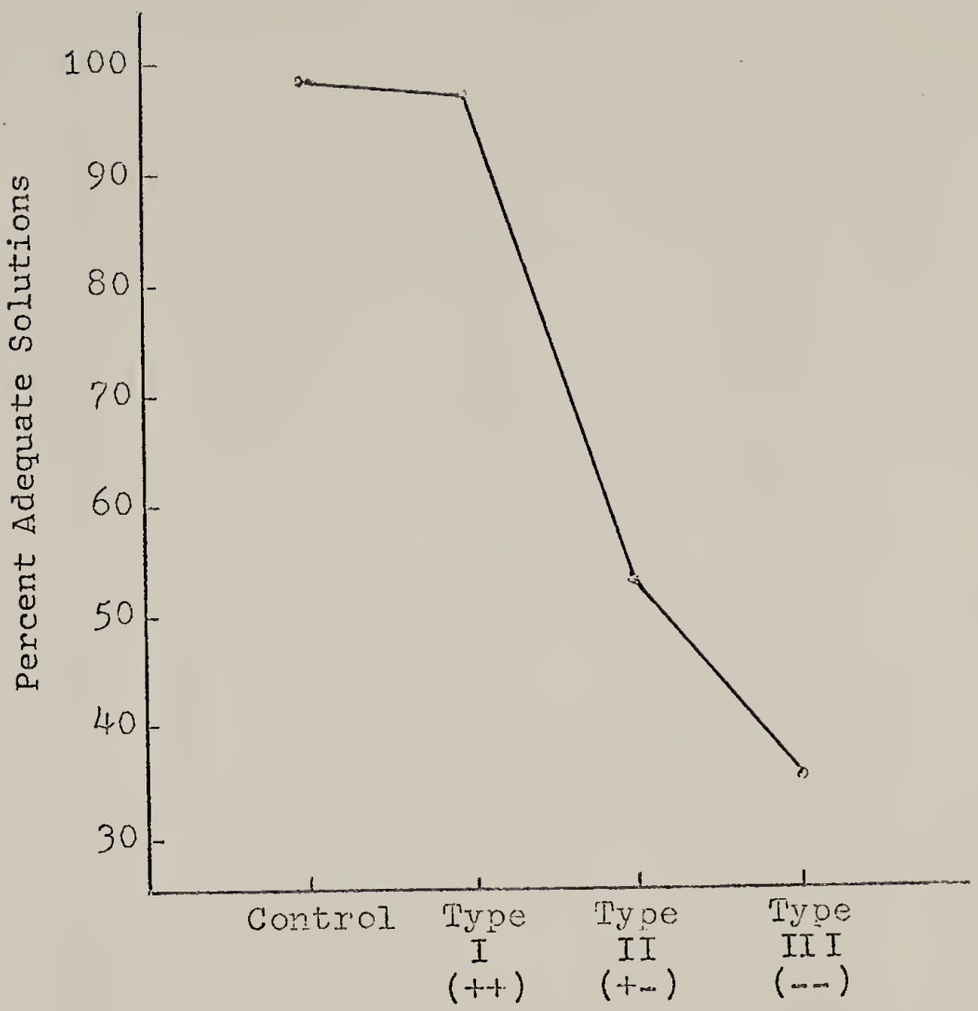

Fig. 1. Percentage of adequate solutions as a function of conflict type.

Table 2

Percentage of Ss

Adequately Resolving the Conflicts

Number of Conflicts Adequately Solved	Percent* of Ss
3	19
2	49
1	30
0	2

*Entries refer to both number of Ss and percentage.

number of conflicts solved was two. Forty-nine percent of Ss solved two conflicts adequately, thirty percent solved one adequately, nineteen percent solved all three adequately, and two percent solved none. As would be expected, among Ss who resolved two conflicts adequately, it was most often the avoidance-avoidance conflict which was the inadequately solved one.

Group Comparisons

Before comparison groups were derived, the effects of order of presentation of conflicts and of sex of subject on adequacy of conflict resolution were considered.

There were three orders of presentation, with each type of conflict appearing first, second, and third in the series an equal number of times. Table 3 presents the three orders and shows the mean number of conflicts adequately solved for each of the orders (1.75, 1.90, and 1.94). T tests of means showed them not to be significantly different.

Mean number of conflicts solved adequately by males and females were 1.97 and 1.73, respectively. Although a t test showed the means not to be significantly different, it was decided to keep the male-female ratio constant across groups, particularly to aid in the control of possible sex differences in problem-solving ability.

Of nineteen Ss who adequately resolved all three

Table 3

Mean Number of Conflicts Adequately Solved as a Function of Order of Presentation of Conflicts

Order	Mean	S.D.
1) Approach-Approach Avoidance-Avoidance Approach-Avoidance	1.75	.750
2) Avoidance-Avoidance Approach-Avoidance Approach-Approach	1.90	.759
3) Approach-Avoidance Approach-Approach Avoidance-Avoidance	1.94	.698

conflicts, the data of only sixteen Ss could be used, as three records were spoiled. These sixteen Ss made up the "good resolvers" group. From the forty-nine Ss who adequately resolved two conflicts, sixteen were chosen at random to make up the "medium" group, with the restriction that the male-female ratio be 10:6, the same as that of the "good solvers" group. Since there were only two Ss who solved zero conflicts, these two Ss were pooled with the thirty who solved one conflict adequately. From these thirty-two Ss, sixteen were chosen at random to form the "poor resolvers" group, once more with the male-female restriction.

These three groups were those used in all subsequent analyses of data. In each group, half of the Ss received the stress condition first, half received the stress condition last.

Analysis of Performance on Maze-Solving

The first analysis was a two-between, one-within subjects analysis of variance for performance on mazes. The unit of measurement was time taken to solve the mazes. In this analysis, as in all subsequent analyses, the between-Ss variables consisted of three levels of conflict resolution and order of presentation of stress and nonstress. The within-Ss variable consisted of the stress versus nonstress condition.

Table 4 presents a summary table of the analysis of variance. There is a significant first order interaction of stress-nonstress and order in which stress and nonstress were presented, and there is a significant second order interaction of stress-nonstress, order, and conflict-resolution group.

Figures 2 and 3 graphically illustrate these interactions. In Figure 2, it can be seen that it is the difference between stress and nonstress in the stress first condition that is accounting for most of the variability, with a marked reduction in performance under stress when the stress condition is presented first. This result was confirmed by separate analyses of the "stress first" and "stress last" conditions. Tables 5 and 6 present summaries of these analyses and show that while there are no significant effects in the "stress last" condition, there is a significant main effect of stress when only the "stress first" condition is considered.

In Figure 3, the interaction of stress, order, and conflict-resolution group is demonstrated. Here it can be seen that while all three conflict-resolution groups showed reduction in performance under stress in the stress first condition, it was the poor conflict solvers who showed the most marked deterioration. This result was

Table 4

Summary of Analysis of Variance for Performance on Maze-Solving

Source	df	Sum of squares	Mean square	F ratio
Total between-Ss	47	71.42		
C (Conflict-resolution)	2	3.24	1.62	1.073
O (Order stress-nonstress)	1	.58	.58	.384
C x O	2	4.22	2.11	1.398
Error between	42	63.38	1.509	
Total within-Ss	48	15.33		
S (Stress-nonstress)	1	.60	.60	2.448
C x S	2	.11	.055	.224
O x S	1	1.84	1.84	7.51 **
C x O x S	2	2.47	1.24	5.061*
Error within	42	10.31	.245	
Total	95	86.75		

*p < .025
**p < .01

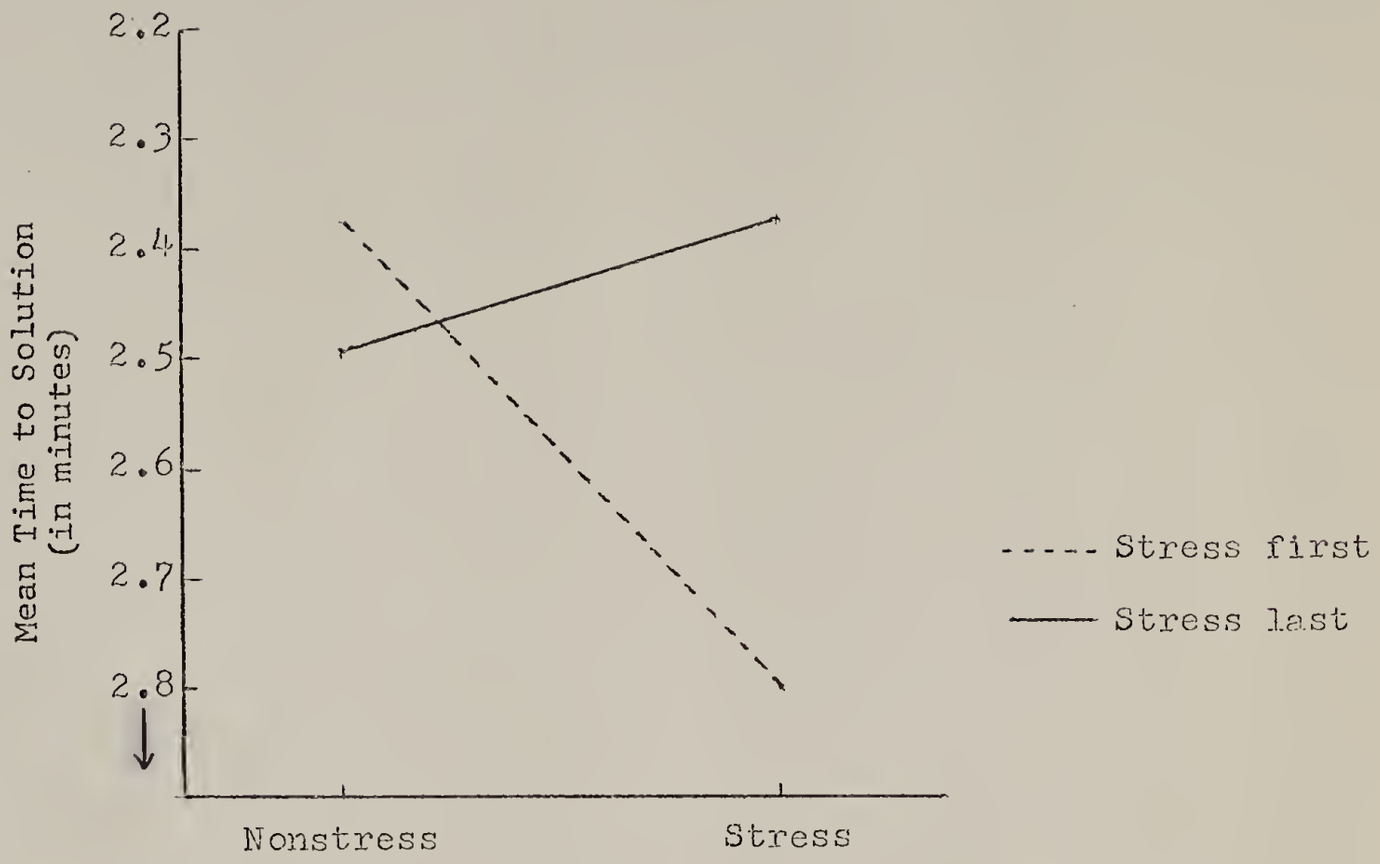

Fig. 2. Graph of mean time taken to solve mazes, showing interaction of stress and order.

Note.--Numbering of mean times is reversed because lower mean time indicates better performance.

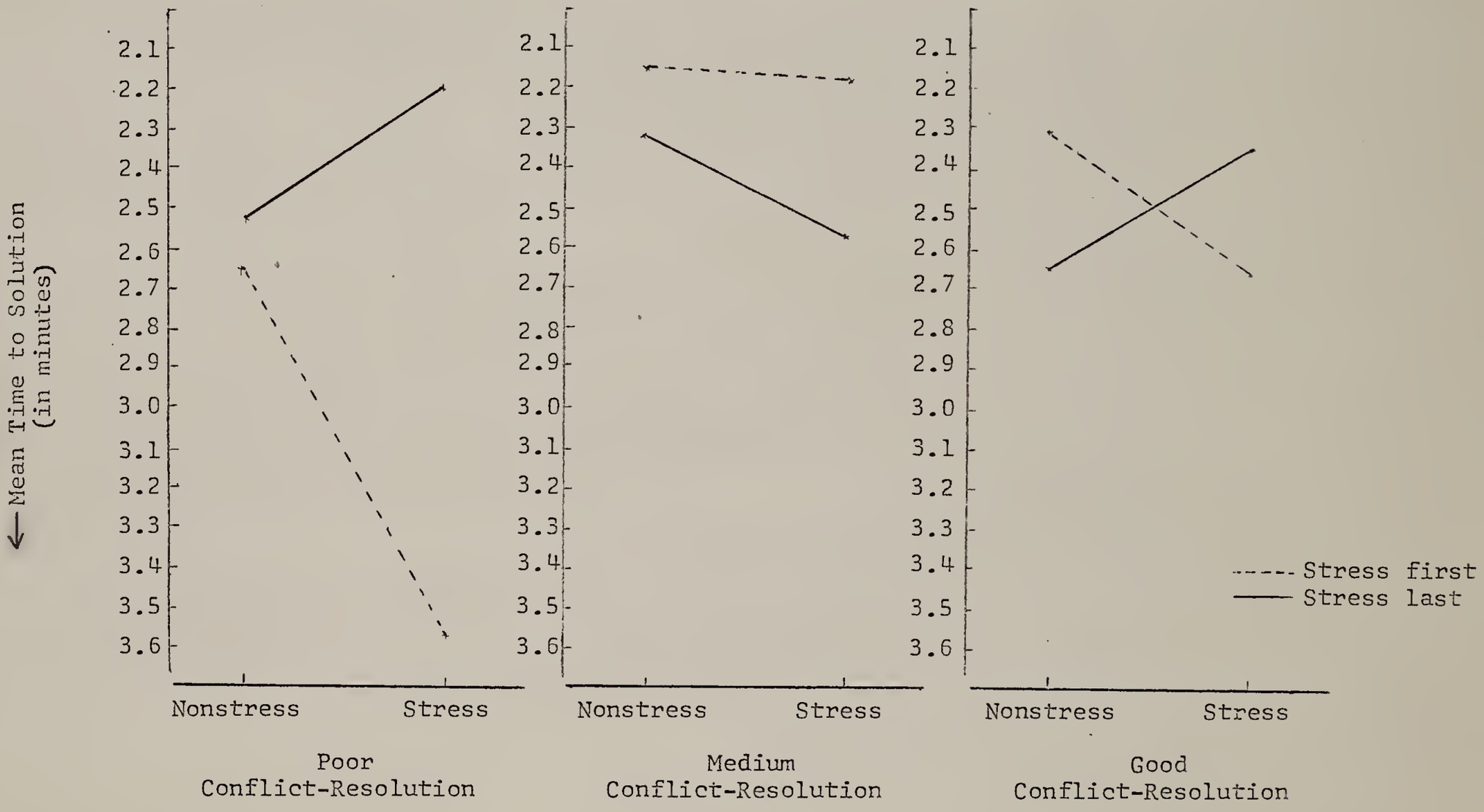

Fig. 3. Graph of mean time taken to solve mazes, showing interaction of conflict-resolution group, stress, and order.

Table 5

Summary of Analysis of Variance for Performance on Maze-Solving--for Stress Presented First

Source	df	Sum of squares	Mean square	F ratio
Total between-Ss	23	43.5073		
C (Conflict-resolution)	2	6.7156	3.3578	1.913
Error between	21	36.8547	1.7549	
Total within-Ss	24	7.7369		
S (Stress-nonstress)	1	2.2709	2.2709	15.1494**
C x S	2	2.3167	1.1583	7.727 *
Error within	21	3.1493	.1499	
Total	47	51.3072		

*$p < .005$
**$p < .001$

Table 6

Summary of Analysis of Variance for Performance on Maze-Solving--for Stress Presented Last

Source	df	Sum of squares	Mean square	F ratio
Total between-Ss	23	27.2648		
C (Conflict-resolution)	2	.1207	.0603	.0466
Error between	21	27.1441	1.2925	
Total within-Ss	24	7.0287		
S (Stress-nonstress)	1	.1692	.1692	.5947
C x S	2	.8850	.4425	1.5553
Error within	21	5.9745	.2845	
Total	47	34.2935		

also confirmed by the separate analysis of the "stress first" condition (see Table 5), in which a significant interaction of stress and conflict-resolution group was found. It is interesting that in the "stress last" condition, both good and poor resolvers showed some improvement in performance under stress, with medium resolvers showing a slight decrement.

Analysis of Performance on Abstract Thinking

Table 7 summarizes the analysis of variance for performance on abstract thinking. The unit of measurement was number of items solved correctly. There is a significant main effect for stress, with mean performance under nonstress higher than mean performance under stress ($\bar{X}_{nonstress} = 18.10$; $\bar{X}_{stress} = 12.23$).

While no other effects were significant in this analysis, it can be seen in Figure 4 that there is a tendency for the good and medium conflict-resolution groups to perform better than the poor conflict-resolution group. In order to pursue this tendency, two separate analyses of variance were carried out, one considering only the "stress first" condition, one considering only the "stress last" condition. Results showed that when only the stress last condition is considered, there is a significant main

Table 7

Summary of Analysis of Variance for Performance on Abstract Thinking

Source	df	Sum of squares	Mean square	F ratio
Total between-Ss	47	987.34		
C (Conflict-resolution)	2	90.27	43.13	2.26
O (Order stress-nonstress)	1	2.04	2.04	.102
C x O	2	58.15	29.07	1.45
Error between	42	836.88	19.92	
Total within-Ss	48	1098.00		
S (Stress-nonstress)	1	828.38	828.38	148.72*
C x S	2	22.56	11.28	2.02
O x S	1	.67	.67	.12
C x O x S	2	12.27	6.13	1.10
Error within	42	234.12	5.57	
Total	95	2085.34		

*$p < .001$

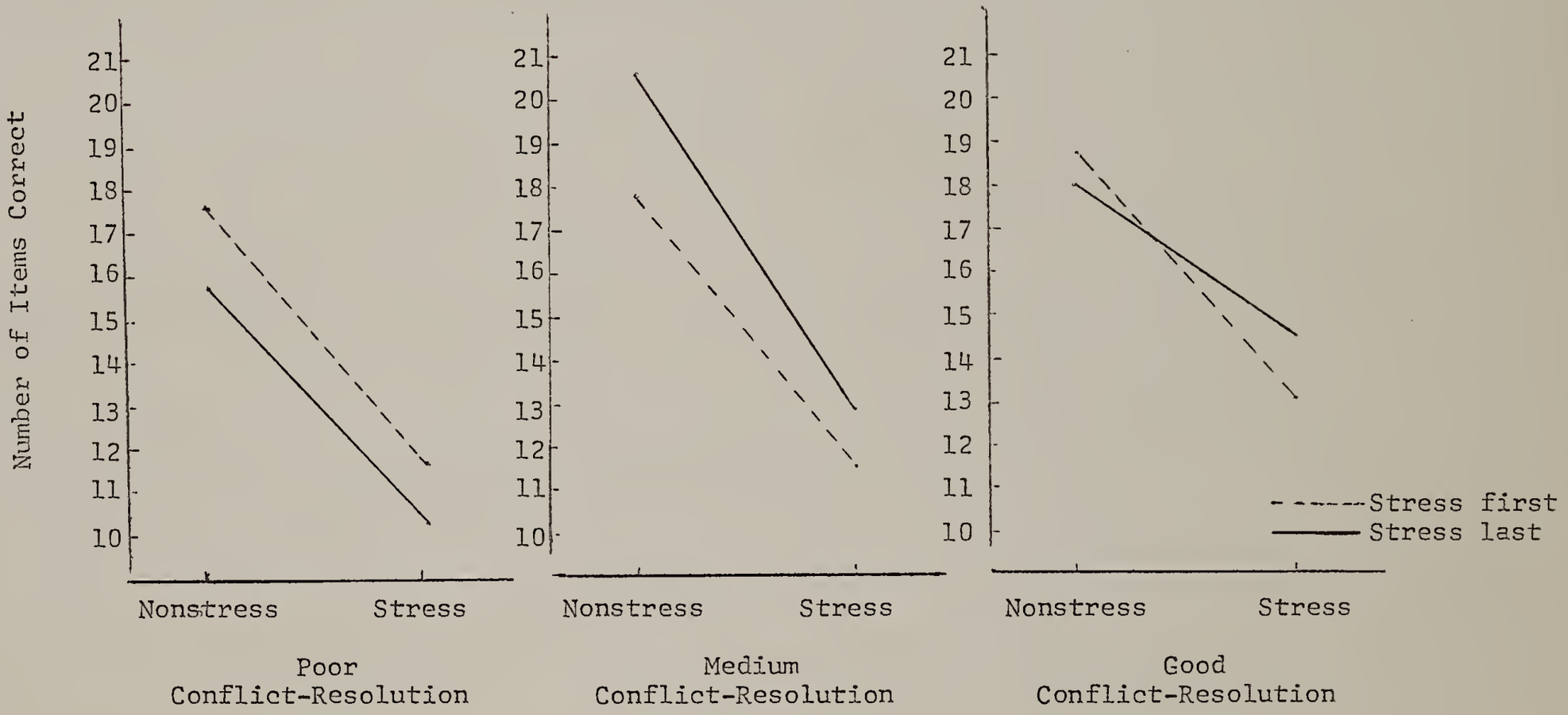

Fig. 4. Graph of performance on abstract thinking.

effect for conflict-resolution group (see Table 8). Inspection of means shows that the medium and good conflict-resolution groups performed about equally well ($\bar{X}_{medium}$ = 16.75, $\bar{X}_{good}$ = 16.19), while the poor conflict-resolution group performed less well ($\bar{X}_{poor}$ = 13.00).

Separate analysis of the stress last condition also showed a significant interaction of conflict-resolution group and stress (see Table 8). The good conflict-resolution group showed the least deterioration in performance under stress (mean change = 3.63); the poor conflict-resolution group was next (mean change = 5.13); and the medium conflict-resolution group showed the greatest deterioration (mean change = 7.75).

Analysis of Performance on Vocabulary

Analysis of vocabulary data, using number of items correct as the unit of measurement, showed a significant main effect for stress (see Table 9), with mean performance under nonstress again higher than under stress ($\bar{X}_{nonstress}$ = 25.46, $\bar{X}_{stress}$ = 21.21). Analysis also revealed a significant second order interaction of conflict resolution, stress, and order. Figure 5 illustrates this effect. Striking is the marked deterioration in performance under stress of the poor conflict-resolution group when

Table 8

Summary of Analysis of Variance for Performance on Abstract Thinking--for Stress Presented Last

Source	df	Sum of squares	Mean square	F ratio
Total between-Ss	23	515.82		
C (Conflict-resolution)	2	130.88	65.44	3.570*
Error between	21	384.94	18.33	
Total within-Ss	24	516.50		
S (Stress-nonstress)	1	391.02	391.02	89.807**
C x S	2	34.04	17.02	3.909*
Error within	21	91.44	4.354	
Total	47	1032.32		

*$p < .05$
**$p < .001$

Table 9

Summary of Analysis of Variance for Performance on Vocabulary

Source	df	Sum of squares	Mean square	F ratio
Total between-Ss	47	3562.34		
C (Conflict-resolution)	2	117.17	58.58	.819
O (Order stress-nonstress)	1	222.11	222.11	3.109
C x O	2	222.31	111.15	1.55
Error between	42	3000.75	71.44	
Total within-Ss	48	955.00		
S (Stress-nonstress)	1	433.50	433.50	42.25 **
C x S	2	10.17	5.08	.495
O x S	1	4.98	4.98	.408
C x O x S	2	75.35	37.67	3.67 *
Error within	42	431.00	10.26	
Total	95	4517.34		

*p < .05
**p < .001

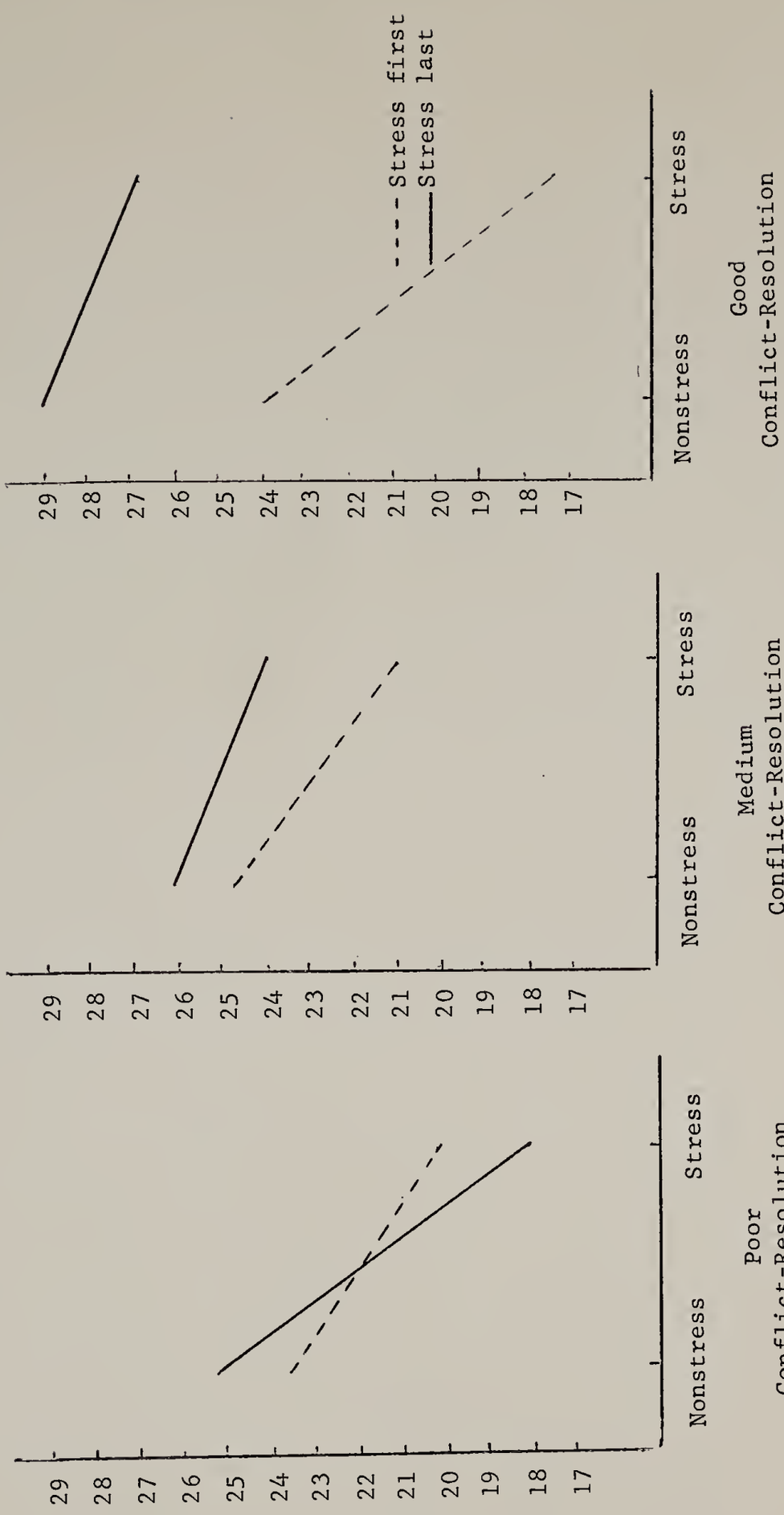

Fig. 5. Graph of performance on vocabulary items, showing main effect of stress and interaction of stress, order and conflict-resolution group.

stress is last, and the marked reduction in performance under stress of the good conflict-resolution group when stress is first.

Separate analyses of variance, carried out for the "stress first" and "stress last" conditions, showed a significant main effect for stress under each condition, but no other significant effects (see Tables 10 and 11).

Analysis of Self-Ratings on Anxiety and Hostility Scales

A one-factor analysis of variance, considering the three levels of conflict resolution, was carried out for each of the six subscales. The unit of measurement for each scale was the sum of self-ratings on that scale. Means and summaries of analysis of variance are presented in Tables 12 to 18.[3] No significant sources of variance were found.

Discussion

Examination of the results reveals that primarily supported was the hypothesis of a relationship between conflict resolution and performance under stress. This was seen particularly in the cognitive-motor task of maze-solving, in which the poor conflict-resolution group showed a deterioration in performance under stress that

[3]Tables 13 to 18 can be found in Appendix B.

Table 10

Summary of Analysis of Variance for Performance on Vocabulary--for Stress Presented First

Source	df	Sum of squares	Mean square	F ratio
Total between-Ss	23	1840.82		
C (Conflict-resolution)	2	38.38	19.19	.223
Error between	21	1802.44	85.83	
Total within-Ss	24	516.50		
S (Stress-Nonstress)	1	266.02	266.02	25.14 *
C x S	2	28.29	14.15	1.337
Error within	21	222.19	10.58	
Total	47	2537.32		

*$p < .001$

Table 11

Summary of Analysis of Variance for Performance on Vocabulary--for Stress Presented Last

Source	df	Sum of squares	Mean square	F ratio
Total between-Ss	23	1499.48		
C (Conflict-resolution)	2	301.16	150.58	2.638
Error between	21	1198.32	57.06	
Total within-Ss	24	438.50		
S (Stress-nonstress)	1	172.52	172.52	17.35*
C x S	2	57.17	28.58	2.875
Error within	21	208.81	9.94	
Total	47	1937.98		

*$p < .001$

Table 12

Group Means and Standard Deviations

for Anxiety and Hostility Scales

Scale		Conflict-Resolution		
		Good	Medium	Poor
Striated Muscle Tension	Mean	24.62	26.12	24.93
	S.D.	4.716	7.122	8.279
Autonomic Anxiety	Mean	28.75	29.43	30.25
	S.D.	6.637	7.680	7.520
Feelings of Insecurity	Mean	39.93	38.93	37.50
	S.D.	11.475	9.820	8.710
Sum of Anxiety Scales	Mean	93.31	94.50	92.68
	S.D.	20.759	24.533	21.718
Hostile Feelings	Mean	18.06	18.37	16.43
	S.D.	3.880	5.802	4.716
Rejection of Hostility	Mean	22.68	25.00	24.56
	S.D.	1.792	3.655	4.848

was much more marked than that of the medium and good conflict-resolution groups.

Porteus (1950) refers to maze-solving as an aspect of intelligence and relates it to "planning capacity"; "ability to inhibit impulsive actions; to make a mental survey of alternative solutions and to choose that one which leads most directly to the desired goal" (p. 12). It is interesting that this capability, which would seem quite analogous to that ability needed in the conflict situation, was in itself not found to be related to conflict resolution. Rather, it was the exercising of this aspect of intelligence or problem-solving under stress that differentiated the conflict-resolution groups.

This relationship received partial confirmation from the abstract thinking task. While the major result was an overall deterioration across groups under stress (due at least in part to the reduction in time limit), separate analyses of the stress first and stress last conditions revealed a significant interaction of conflict-resolution group and stress in the stress last condition. The good conflict-resolution group showed the least deterioration under stress.

Also significant was a main effect of conflict-resolution group in the stress last condition, with the good

and medium conflict-resolution groups performing better than the poor conflict-resolution group. This finding provides some support for the hypothesis of a relationship between conflict resolution and at least one type of problem-solving ability. And, since abstract thinking tasks of this type are traditionally considered aspects of intelligence (Anastasi, 1961), it would seem that conflict resolution may be in part related to certain aspects of general intellectual ability, independent of stress.

Findings on the vocabulary task are both intriguing and puzzling. First, the overall deleterious effect of stress is interesting, for vocabulary is generally characterized as an indicator of simple learning and memory and as very stable and non-deteriorative (Rapaport, 1945). Some of the deterioration is of course due, as in the abstract thinking task, to a reduction in time given. Many subjects reported, however, that they did indeed feel that their performance was slowed down and hindered by the stress condition.

Puzzling is the fact that while all groups show deterioration under stress, the two groups which stand out in terms of marked reduction are: (a) poor conflict resolvers who had the stress condition last; (b) good conflict resolvers who had the stress condition first. Added to this

is the finding that the good conflict solvers who had the stress condition last showed less deterioration under stress than any other group.

One possible explanation is that stress may affect performance on a task such as vocabulary in two different ways: (a) it may interfere directly with memory and concentration and thus slow down performance; (b) it may affect a person's strategy or cognitive approach to the task--i.e., whether he goes straight down the list of words, guessing as he goes, or whether he skips around looking for words he knows. These differences in strategy could have differential effects on performance. In the present study, it was difficult to objectively assess whether there were any group differences along these lines, although differences in strategy were in evidence. This would be an interesting issue to pursue in further research.

A major implication of the present study is that it is not enough to consider behavior in a conflict situation as simply a function of general intelligence and ability, for the stress factor is operative. This is the rationale behind "situational stress tests," as devised, for example, by the government during the war to evaluate candidates for military intelligence (Anastasi, 1961). It would be

interesting to see whether performance on the simple cognitive-motor conflict task used in the present study is indeed meaningfully related to performance in other stress situations and whether it could be used as an analogue.

Summary

This study investigated the relationship of adequacy of conflict resolution to general problem-solving ability, performance under stress, and self-ratings on anxiety and hostility.

On the basis of their performance on a cognitive-motor conflict-resolution task, Ss were placed into one of three groups: good, medium or poor conflict resolvers. To assess the relationship of conflict resolution to problem-solving ability and general intellectual functioning, the groups were compared on performance on two problem-solving tasks (maze-solving and abstract thinking) and on a vocabulary test. To assess the relationship of conflict resolution to performance under stress, parallel forms of the above three tasks were presented under stressful conditions, and the performance of the three conflict-resolution groups was again compared. Finally, the groups were compared on self-ratings on a questionnaire consisting of anxiety and hostility scales.

Primarily supported was the relationship between conflict resolution and performance under stress, particularly on the maze-solving task, in which the poor conflict-resolution group showed more marked deterioration

under stress than the good or medium groups.

The relationship between conflict resolution and performance under stress received some support from the abstract thinking task. With this task, however, also seen was a relationship between adequacy of conflict resolution and adequacy of performance independent of stress.

The vocabulary test did not yield clear-cut results. An explanation in terms of differences in strategy on the part of the subjects was offered as a possibility.

There were no differences among conflict-resolution groups on the anxiety and hostility scales.

The major implication was that it is not enough to consider conflict-resolution as simply a function of general intellectual or problem-solving ability; ability to perform under stress must also be considered. The possibility of relating the cognitive-motor conflict task used in this study to situational stress tests was discussed.

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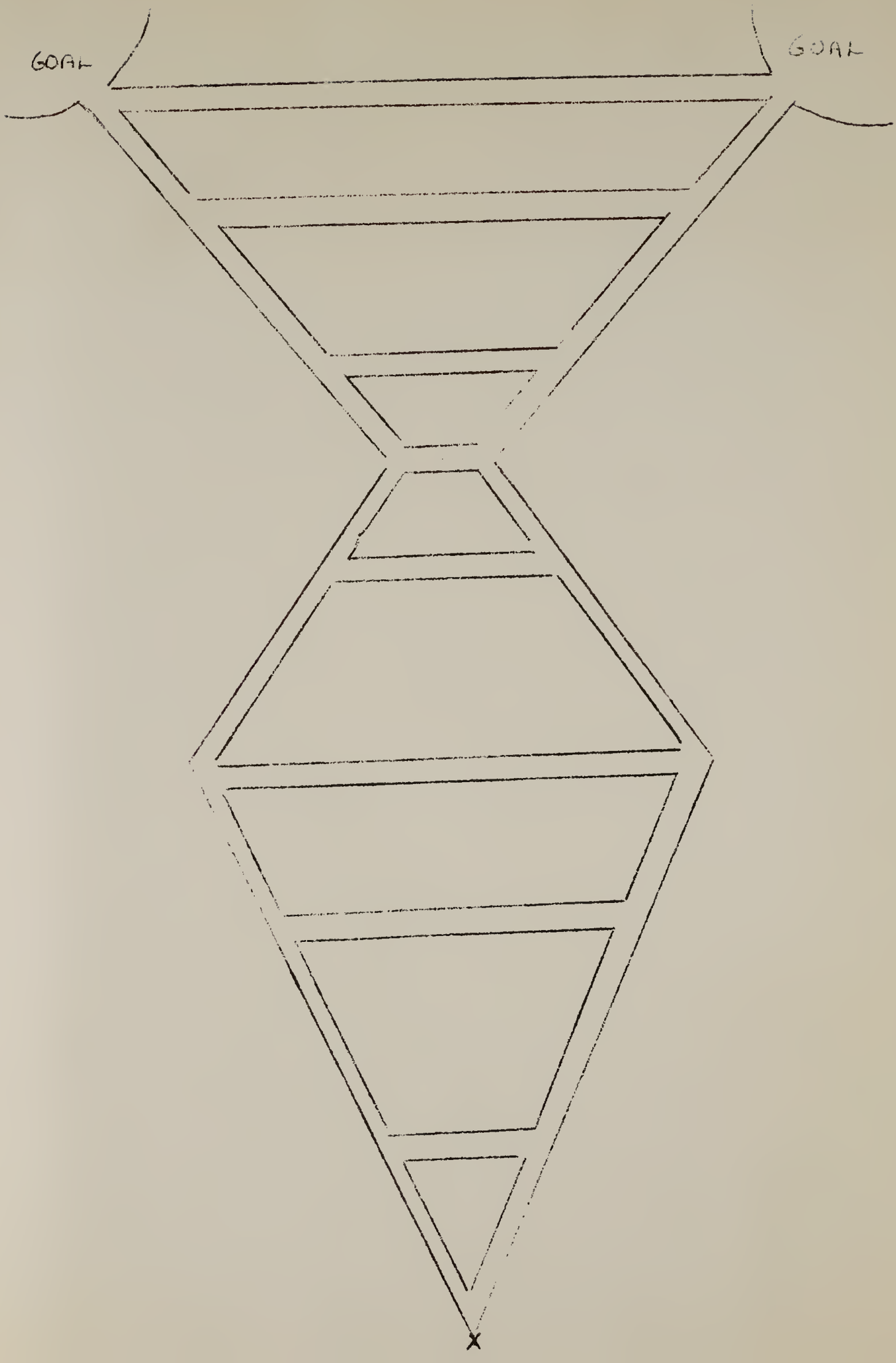
APPENDIX A

1. Maze for conflict resolution task.
2. Maze sets for maze-solving task.
3. Instructions for mazes--stress presented first.
4. Tests of abstract thinking.
5. Time schedule for stress condition of abstract thinking test.
6. Instructions for abstract thinking and vocabulary tests--stress presented first.
7. Vocabulary tests.
8. Time schedule for stress condition of vocabulary test.
9. Questionnaire and key to scales.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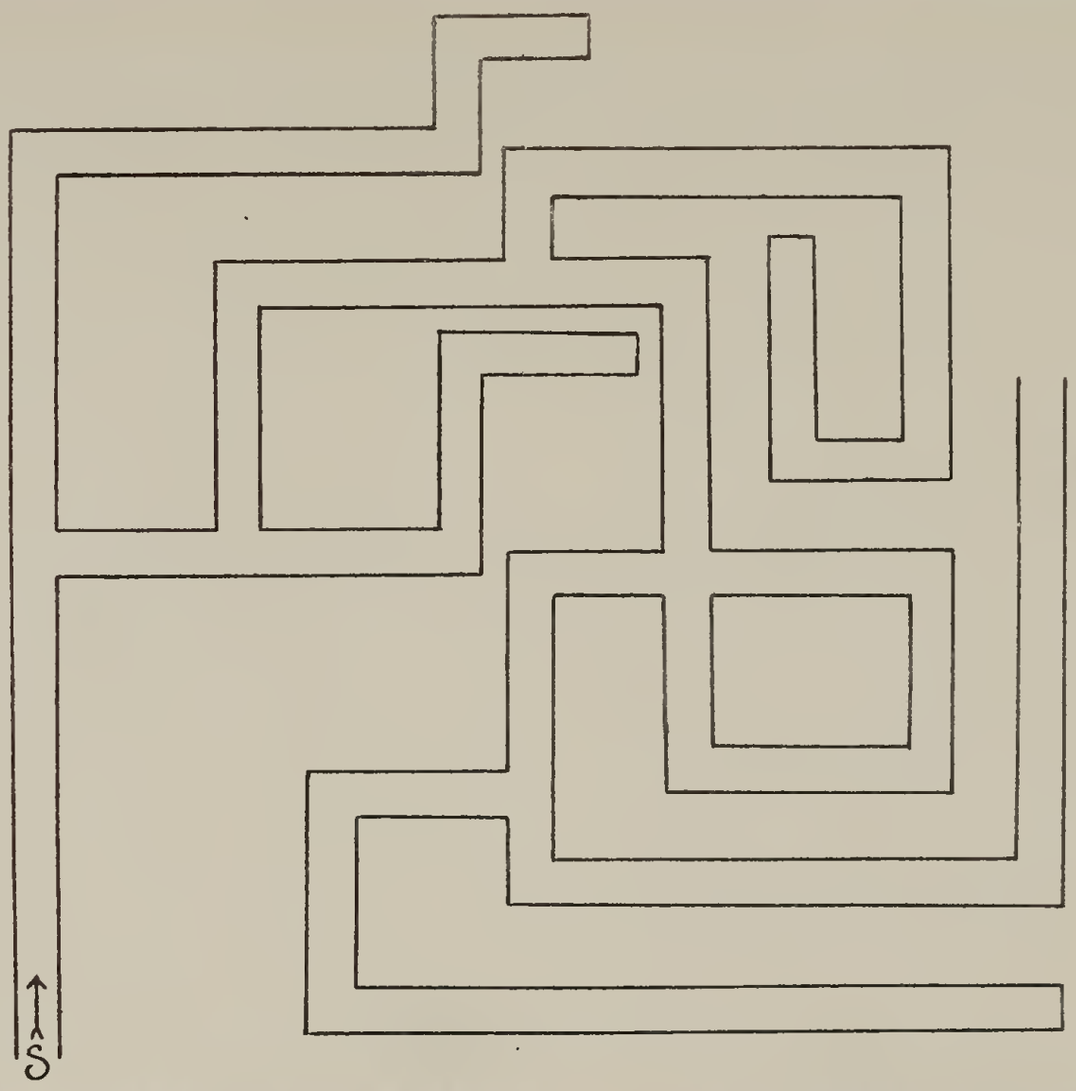

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The Psychological Corporation, New York, N. Y.

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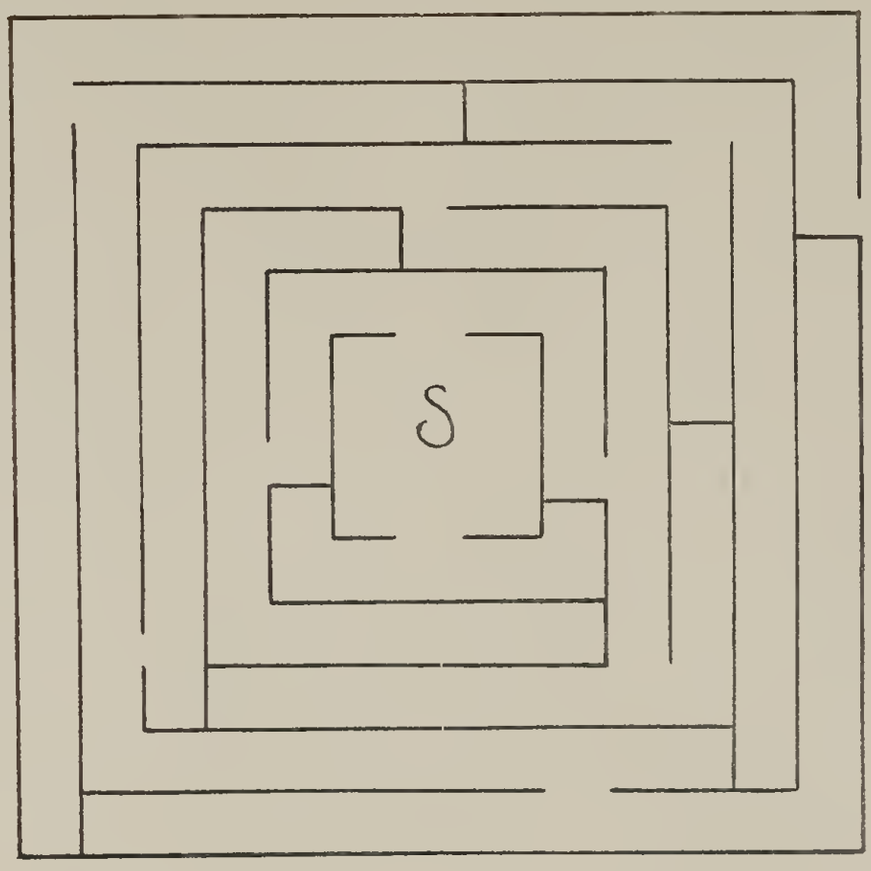

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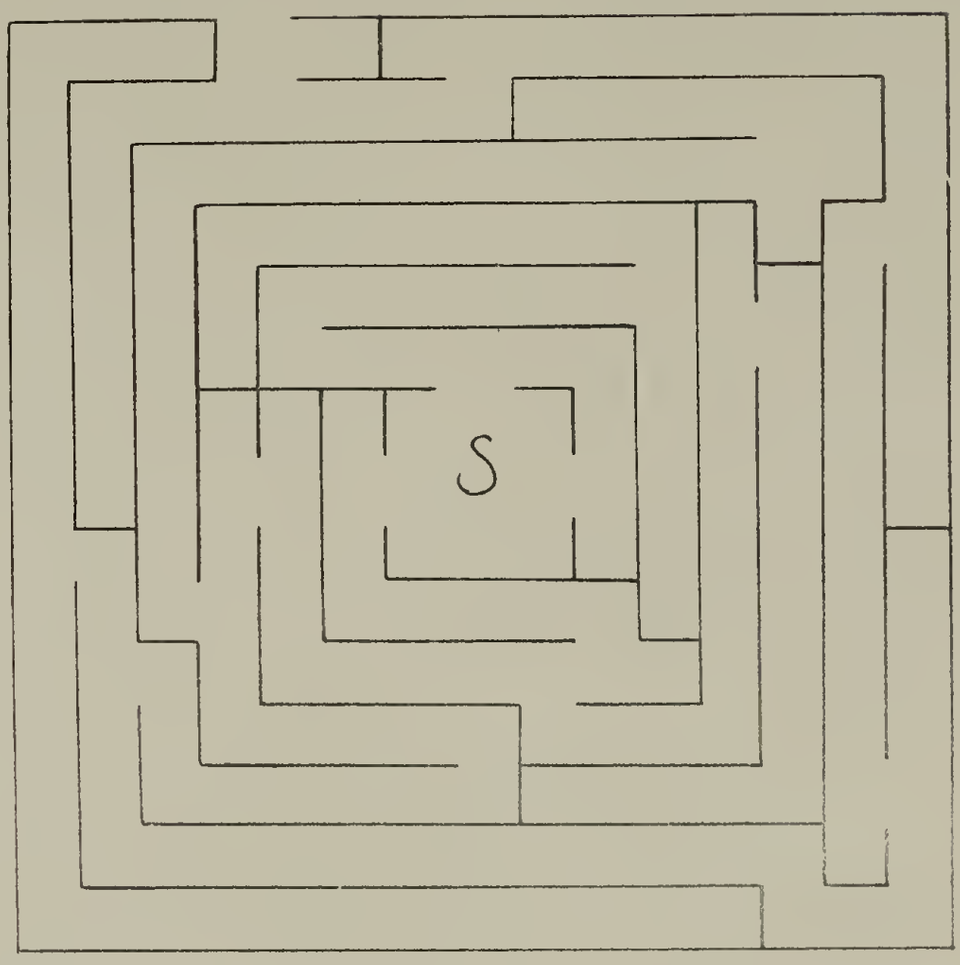

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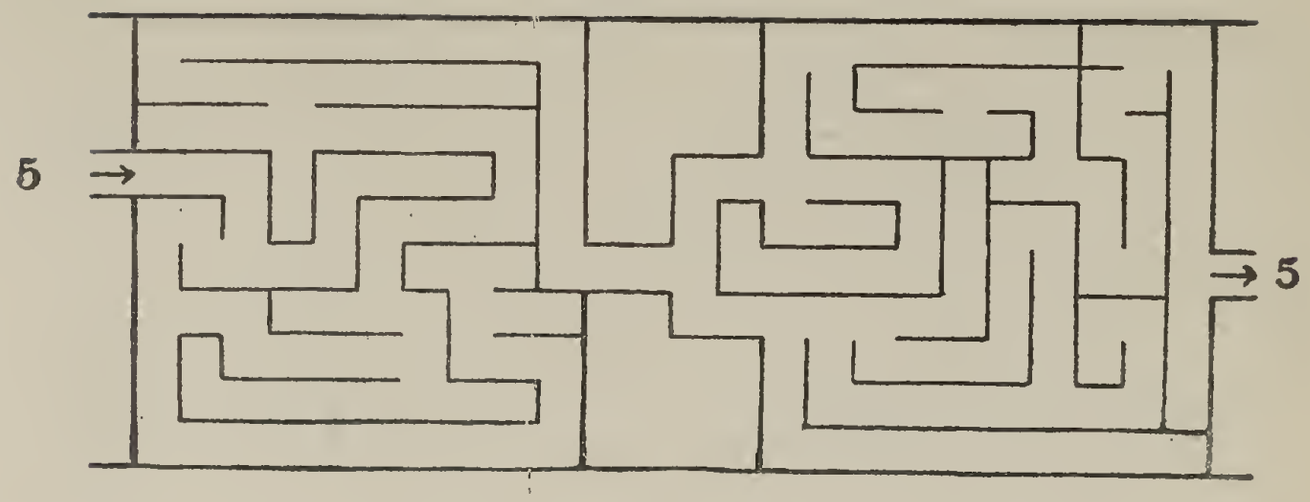
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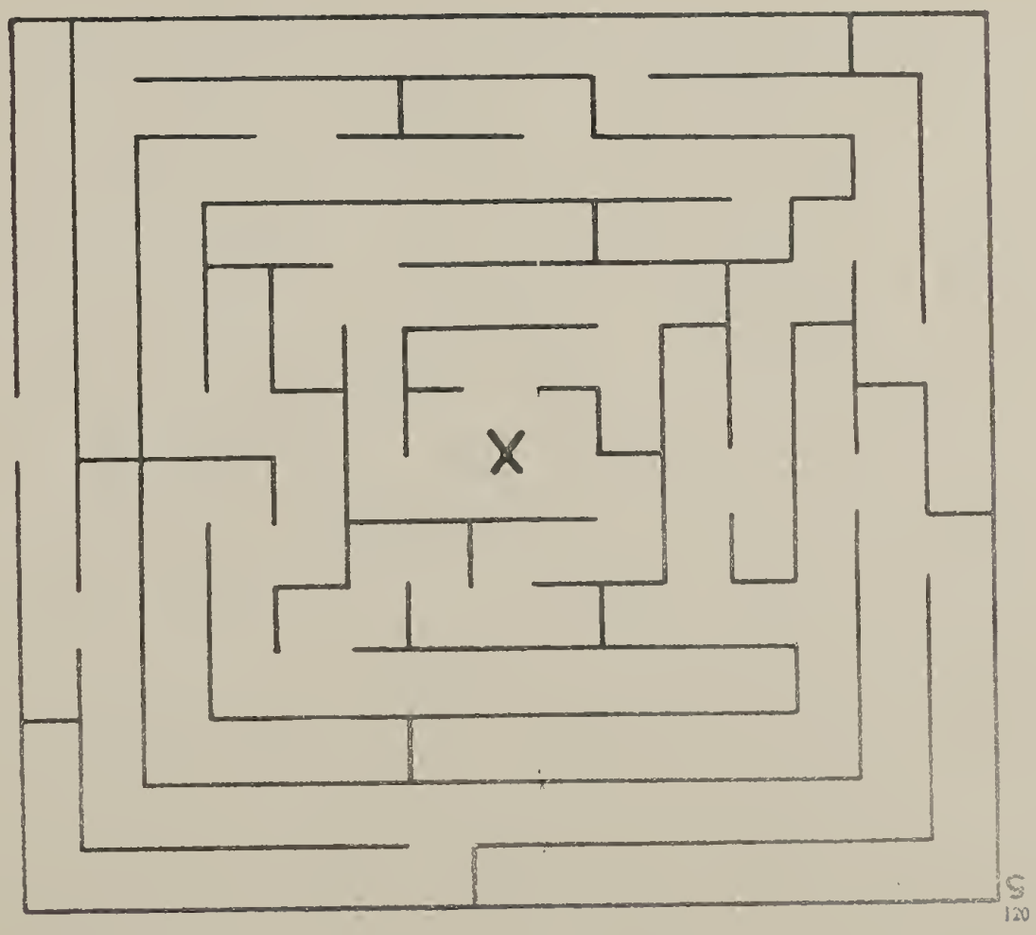

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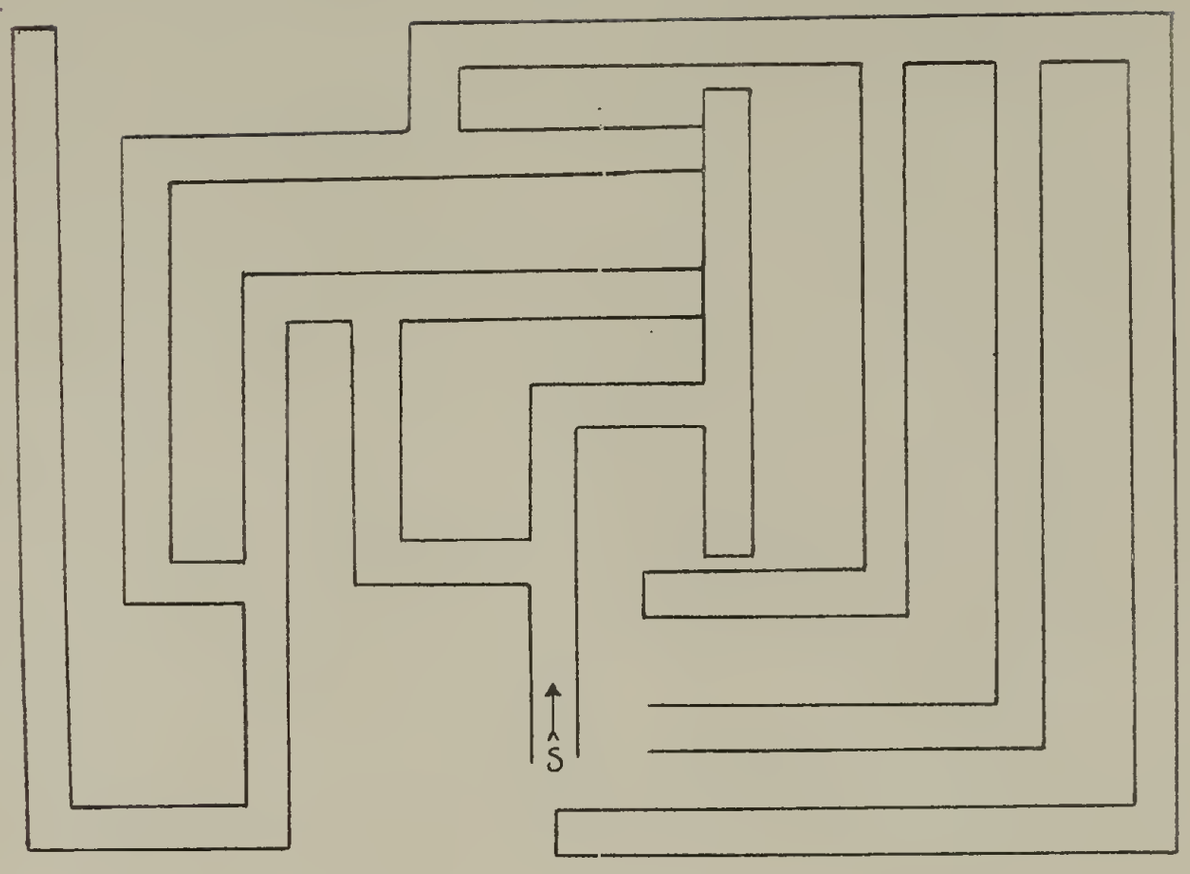

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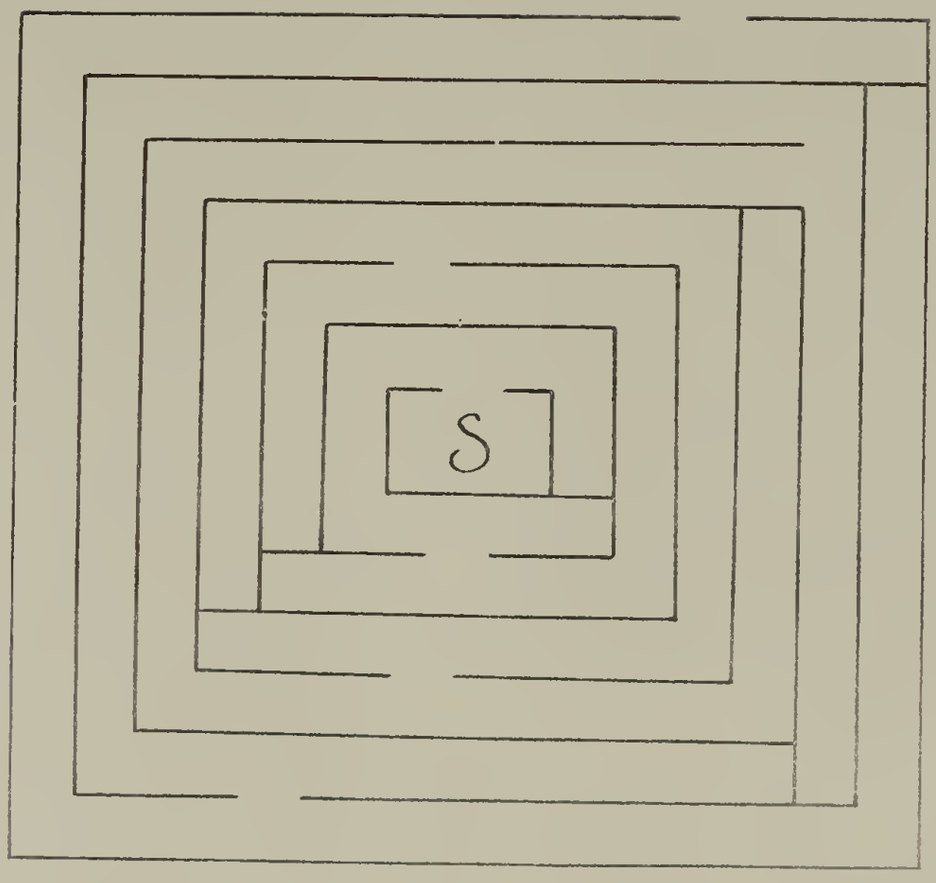

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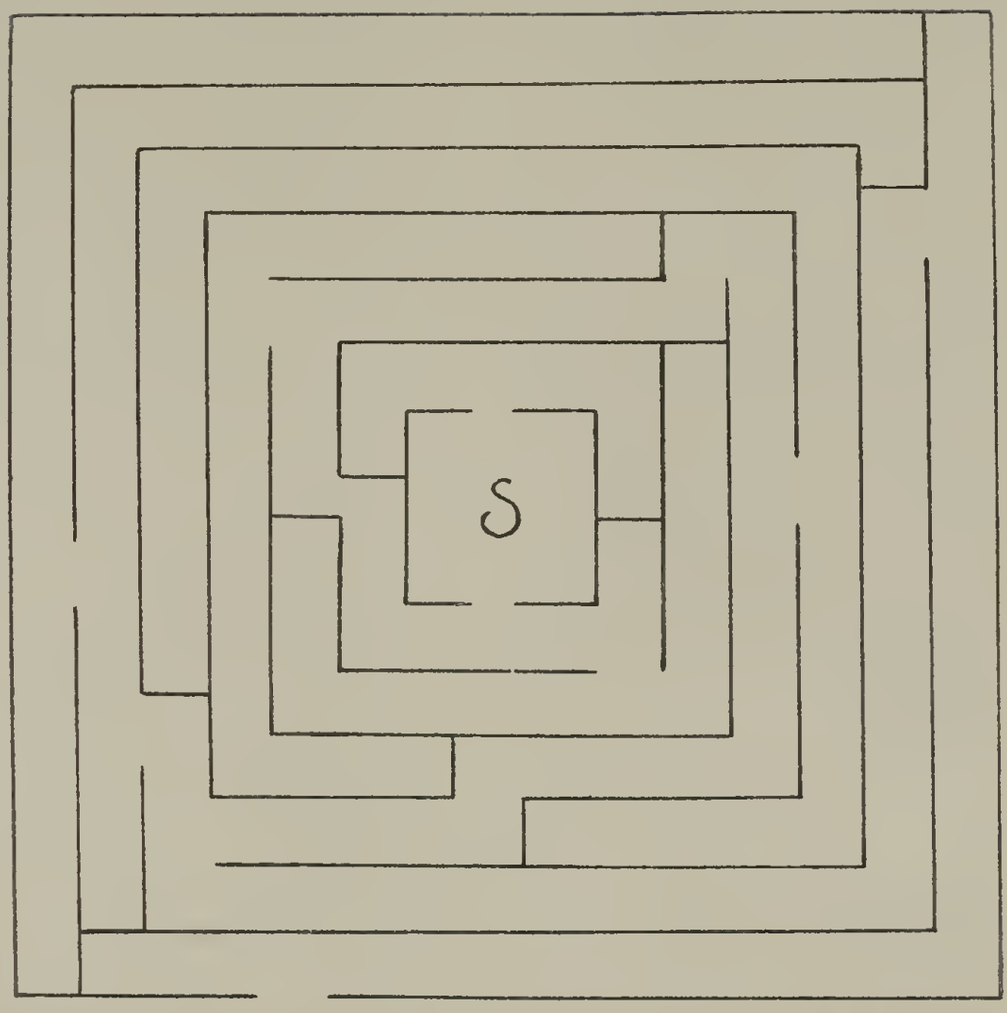

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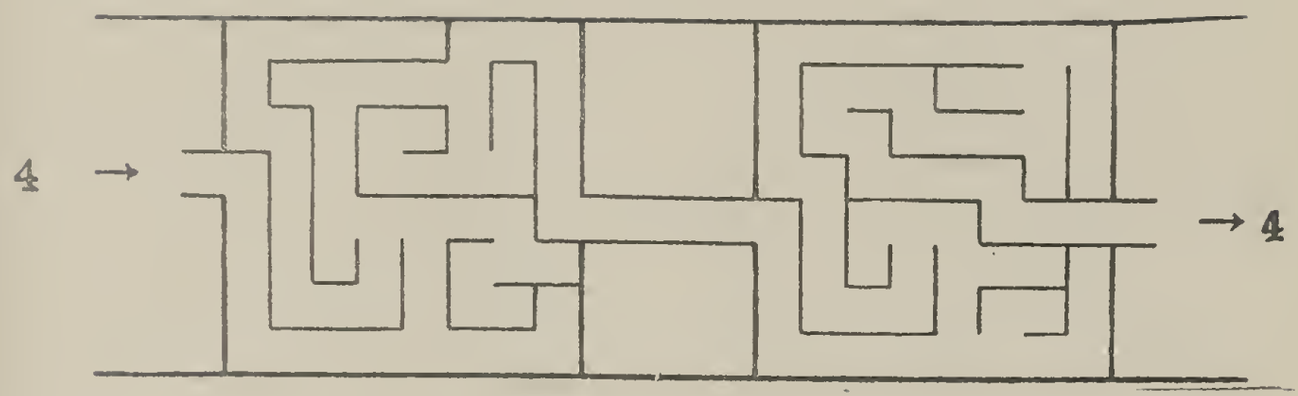
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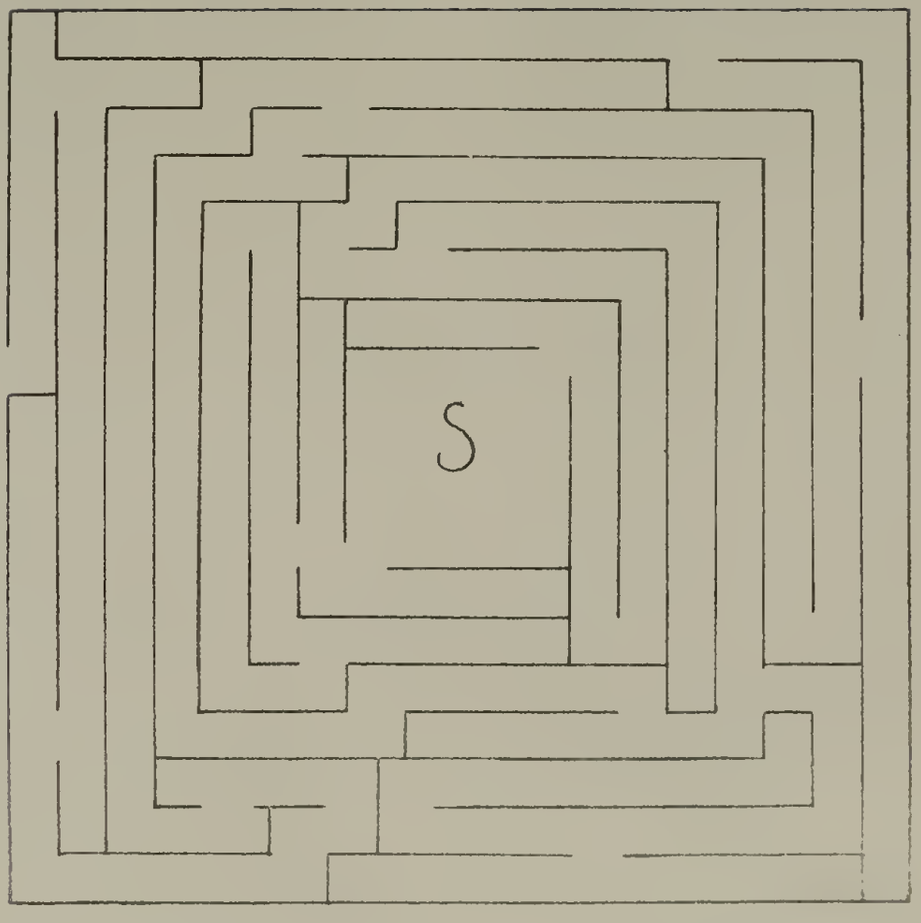

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40-158T

Arthur Point Scale of Performance Tests II, 1946 Revision

The Psychological Corporation, New York, N. Y.

Instructions for Mazes--Stress Presented First

Stress Condition:

I am going to present you with a series of mazes, one at a time, and I want you to solve them as quickly as you possibly can and with as few errors as possible. Speed is very important, and I'll be timing you and telling you at frequent intervals how long you are taking. When I say "ready," place the point of your pencil at the starting point, and when I tell you to "begin," trace your way out of the maze. Remember to find your way out as quickly and as accurately as possible. Ready? Begin.

Nonstress Condition:

Now I have a second series of mazes for you to solve, but this time the pressure will be eased. For although speed and accuracy are still important, I won't be calling out the time. So just relax and solve them as best you can, but still as quickly and as accurately as you can. Ready? Begin.

NAME_____

The numbers in each series below follow some rule. For each series, find the next two numbers and write them on the two lines provided.

Example:	2	4	6	8	10	12	14	16
1.	8	1	6	1	4	1	____	____
2.	1	2	4	8	16	32	____	____
3.	12	14	13	15	14	16	____	____
4.	1	2	5	11	12	15	____	____
5.	29	28	26	23	19	14	____	____
6.	9	10	8	24	6	7	____	____
7.	16	8	4	2	1	1/2	____	____
8.	1	4	9	16	25	36	____	____
9.	15	15	13	10	10	8	____	____
10.	7	9	12	8	3	9	____	____
11.	10	9	6	8	12	7	____	____
12.	16	11	19	15	22	19	____	____

In each of the following items, find the relation between the first two words and underline the word in parentheses that is related in the same way to the third word.

Example: sky:blue :: grass:_____ (table, green, warm, big)

1. moon:earth :: earth:_____ (Mars, stars, sun, clouds, universe)

2. sorrow:misfortune :: joy:_____ (grief, hatred, happiness, success, pride)

3. coal:weight :: milk:_____ (bottle, size, volume, height, cream)

4. our:I :: your:_____ (me, he, my, mine, you)

5. dismal:dark :: cheerful:_____ (laugh, house, gloomy, bright)

6. disease:sanitation :: accident:_____ (doctor, hospital, care, bandage, cleanliness)

(go on to next page)

7. food:starvation :: air:_____ (breathing, suffocation, ventilation, capacity, nourishment)

8. physics:motion :: _____:blood (temperature, body, veins, physiology)

9. my:I :: his:_____ (its, he, me, him, his)

10. inch:space :: minute:_____ (full, mile, measure, time, hour)

11. one:three :: nine:_____ (ten, seven, five, four, twelve)

12. ocean:gulf :: continent:_____ (cape, hill, bay, land, lake)

Note: Items are taken from:

Psychological Examination for College Freshmen. American Council on Education.

Ohio State University Psychological Test

Revision of Army Alpha Examination, Form B.

NAME_____

The numbers in each series below follow some rule. For each series, fine the next two numbers and write them on the two lines provided.

Example:	2	4	6	8	10	12	14	16
1.	25	25	21	21	17	17	____	____
2.	4	5	8	9	12	13	____	____
3.	3	4	6	9	13	18	____	____
4.	3	6	5	5	8	7	____	____
5.	18	14	17	13	16	12	____	____
6.	17	14	7	21	18	9	____	____
7.	15	16	14	17	13	18	____	____
8.	21	18	16	15	12	10	____	____
9.	8	10	12	10	12	14	____	____
10.	6	42	7	12	48	16	____	____
11.	18	10	4	11	16	12	____	____
12.	21	19	20	17	19	15	____	____

In each of the following items, find the relation between the first two words and underline the word in parentheses that is related in the same way to the third word.

Example: sky:blue :: grass:_____ (table, green, warm, big)

1. ice:water :: water:_____ (land, steam, cold, river, thirst)
2. riot:duel :: chorus:_____ (twins, music, duet, selection, song)
3. music:noise :: harmonious:_____ (hear, accord, violin, discordant)
4. I:us :: he:_____ (him, his, they, them, we)
5. hope:cheer :: despair:_____ (grave, repair, death, depression)
6. book:knowledge :: _____:money (paper, dollars, bank, work, gold)
7. darkness:stillness :: light:_____ (moonlight, sound, sun, window)

(go on to next page)

8. fear:anticipation :: regret:_____ (memory, hope, sorrow, hate, forget)

9. our:we :: your:_____ (yours, you, us, their, they)

10. disease:crisis :: drama:_____ (novel, stage, plot, cure, climax)

11. J:Q :: G:_____ (O, R, T, M, I)

12. ferry:bridge :: elevator:_____ (skyscraper, stairs, electricity, freight)

Time Schedule for Stress Condition of Abstract Thinking Task

"20 seconds are gone.
40 seconds are gone.
1 minute.

1 minute 15 seconds.
1½ minutes.
1 minute 45 seconds.
2 minutes gone.

2 minutes 15 seconds gone.
2½ minutes.
2 minutes 45 seconds.
3 minutes gone, only 3 minutes to go.

2 minutes 15 seconds left.
2½ minutes.
2 minutes 15 seconds.
2 minutes left.

1 minute 45 seconds left.
1½ minutes.
1 minute 15 seconds.
1 minute left.

50 seconds.
40 seconds.
30 seconds.
25 seconds.
20 seconds.
15 seconds.
10 seconds.
5 seconds.
Stop!"

Instructions for Abstract Thinking and Vocabulary Tests--Stress Presented First

Stress Condition:

When I tell you to begin, put your name on the form, read the directions, and complete the items. You will have only (6, 3) minutes, so work as quickly as you can, and at intervals I'll be telling you how much time you have left. Okay, begin.

Nonstress Condition:

You now have a second set of items to complete, but this time you will have (12, 6) minutes to do them. This should give you plenty of time to do all the ones you can. Okay, begin.

NAME_____

In the test below, the first word in each line is printed in capital letters. Opposite it are five other words. Draw a line under the one word which means the same thing, or nearly the same thing, as the first word. If you don't know, guess.

1. REPULSIVE	interesting, immoral disgusting, exciting, hasty
2. CONSUMMATED	discussed, perfected, brought to naught, approved blessed
3. DISDAINFUL	scornful, suspicious, impatient, appreciative, unworthy
4. COMPLACENT	embarrassed, wistful, attractive, motherly, self-satisfied
5. SEETHES	roars, tumbles, boils, flows rapidly, cools off
6. SULLIES	flouts, diminishes, clears, stains, destroys
7. OBSEQUIOUS	servile, insulting, appealing, indecent, dignified
8. INVEIGLED	forced, frightened, bribed, enticed, asked
9. PROHIBITED	urged, ordered, shown, forbidden, made lawful
10. REFULGENT	repellent, very bright, mischievous, flattering, tolerant
11. STUPOR	cellar, fortune, dunce, mud-hole, daze
12. ANCILLARY	executive, standing, temporary, subordinate, newly appointed
13. REVOLVING	electric, rotating, stationary, round, waving
14. ATYPICAL	witty, antagonistic, canny, unrepresentative, genuine
15. DOUSED	serenaded, dried, entertained, drugged, ducked
16. COLLUSION	lawlessness, interference, injury, fraud, bumping
17. SOLEMN	lonely, grave, merry, insolent, peculiar
18. AMELIORATED	concealed, made worse, stated, improved, studied
19. APPRAISED	evaluated, mortgaged, bought, liked, developed
20. PARAGON	geometric figure, statue, model, judge, burlesque

(go on to next page)

21.	TANTALIZING	serious, teasing, unimportant, mythical, examining
22.	DASTARDS	daring fellows, orphans, illegitimate children, cowards, boasters
23.	ACRIMONIOUS	discouraging, friendly, bitter, formal, haughty
24.	INTRANSIGENT	helpless, easily swayed, prejudiced, irreconcilable, aimless
25.	QUIESCENT	noisy, inactive, aged, reverent, typical
26.	RAMIFY	cross, join, hum, branch out, run parallel
27.	CUMBERSOME	tiny, untidy, fragile, well-wrapped, unwieldy
28.	QUAIL	attack, scatter, squabble, cower, retreat
29.	SACERDOTAL	priestly, legal, ancient, blasphemous, secret
30.	ANIMATED	prolongued, friendly, intellectual, lively, bitter
31.	LENIENT	alien, one-sided, severe, mild, civil
32.	SPIRITUAL	non-physical, intellectual, dreamy, material, didactic
33.	BRAVED	escaped, endured, dared, prophesied, boasted about
34.	CONGRUENCE	harmony, poor taste, dissimilarity, shortage, combination
35.	PEASANTS	citizens, rustic laborers, servants, artisans, Russians
36.	ILLUSION	secret agreement, ailment, diagram, view, deception
37.	PEREMPTORY	persuasive, uncertain, decisive, distinguished, angry
38.	RETRACTS	repents, repeats, withholds, outlines, withdraws
39.	STILTED	irresolute, stately, improper, stiffly formal, informal
40.	VENTED	restrained, swallowed, poured forth, regretted, hid

Note.--Items are taken from English Vocabulary, Worksample 95, Form AD.

NAME_____

In the test below, the first word in each line is printed in capital letters. Opposite it are five other words. Draw a line under the one word which means the same thing, or nearly the same thing, as the first word. If you don't know, guess.

1.	SCHEMES	interests, shirts, plans, difficulties, etchings
2.	RAZED	burned, rebuilt, plundered, demolished, awakened
3.	FRETFUL	contented, dangerously ill, irritable, discouraged, tiresome
4.	SCRUPULOUS	conscientious, persistent, careless, splendid, distrustful
5.	ALLAY	justify, calm, arouse, hand on, confirm
6.	SYNCHRONOUS	simultaneous, peculiar, timely, chronological, alarming
7.	EQUIVOCAL	corresponding, ludicrous, definite, ambiguous, horselike
8.	MAGNANIMITY	learning, great power, noble generosity, efficiency, selfishness
9.	TWIDDLED	sprained, broke, sucked, twirled, snapped
10.	SCURRILOUS	hurrying, desperate, abusive, highly complimentary, cunning
11.	ABANDON	persecute, desert, mock, come with, restrain
12.	CELIBATE	hermit, imbecile, drunkard, pleasure lover, unmarried man
13.	BLEAK	inviting, overgrown, desolate, rocky, precipitous
14.	POLYGLOT	glutton, linguist, abstainer, reformer, melting pot
15.	UNFAILING	dependable, false, unreliable, insolvent, unsympathetic
16.	ANTITHESIS	development, similarity, dislike, contrast, dissertation
17.	ADMIRABLE	excellent, obliging, vain, naval, shrewd
18.	ONEROUS	ignoble, illustrious, burdensome, ordinary, monotonous

(go on to next page)

19.	SURVIVED	died before, excelled, outlived, followed, restored
20.	IMPERTURBABLE	inscrutable, tranquil, efficient, excitable, reliable
21.	CHASTISEMENT	punishment, classics, morality, coaching, patience
22.	STATURE	breadth, height, design, position, image
23.	RUDDY	wrinkled, fat, weather-beaten, pale, red
24.	TEMERARIOUS	rash, cowardly, treacherous, cautious, high-spirited
25.	RECTITUDE	promptness, righteousness, preaching, posture, courtesy
26.	ARROGANCE	humility, wickedness, haughty pride, indifference, foolishness
27.	CALUMNY	chance, slander, disease, recommendation, prejudice
28.	JAUNTY	bilious, dejected, sturdy, gay, touristlike
29.	EXCHEQUER	money value, aim, stock, money supply, vitality
30.	SUPPLANTED	buried, stood by, displaced, worked under, assisted
31.	MARTIAL	classical, warlike, wedding, popular, doleful
32.	OSTRACIZED	operated on, confined, convicted, criticized, banished
33.	HAMLET	couch, home, island, village, forest
34.	VANTAGE	inferiority, responsibility, favorable condition, honor
35.	PINNACLE	ideal, mast, temple, small boat, peak
36.	TORRID	icy cold, humid, hot, nasty, rainy
37.	CONVERSANT	unacquainted, familiar, surfeited, in agreement, gifted
38.	INCONTROVERTIBLE	unsound, stupid, pointed, indisputable, vague
39.	BESEECHES	entreats, gives, spurns, offers, obtains
40.	POTION	power, drink, part, idea, task

Time Schedule for Stress Condition of Vocabulary Test

15 seconds are gone.
30 seconds are gone.
40 seconds are gone.
1 minute gone--2 minutes to go.

1 minute 45 seconds to go.
1½ minutes.
1 minute 15 seconds.
1 minute left.

50 seconds.
40 seconds.
30 seconds.
25.
20.
15.
10.
5.
Stop!

Name_____

Age_____Sex_____Date_____

INSTRUCTIONS: The following are some statements on feelings, daydreams, attitudes, and behavior. Read each statement and decide how often it applies to you. Circle "1" if the statement never applies to you; "5" if you experience it almost all the time; use "2", "3", and "4" for in between ratings.

Never = 1, Rarely = 2, Sometimes = 3, Fairly often = 4, Nearly always=5

A few items may be difficult to answer by checking frequencies. For these, you may indicate how true or false the item is for you by using "1" for "Definitely false," "3" for "Questionable," "5" for "Definitely true," and "2" and "4" for in between ratings.

Be honest, but do not spend too much time over any one statement. As a rule, first impressions are as accurate as any. Are there any questions?

Note.--For origin of items, see:

Fenz, W. D. and Epstein, S. "Manifest anxiety: Unifactorial or multifactorial composition?" Perceptual and Motor Skills, 1965, 20, 773-780.

Saltz, G. and Epstein, S. "Thematic hostility and guilt responses as related to self-reported hostility, guilt, and conflict." J. Abnorm. Soc. Psychol., 1963, 67, 469-479.

Never = 1 Rarely = 2 Sometimes = 3 Fairly often = 4 Nearly always = 5

1. I am an easy-going person. 1 2 3 4 5
2. I believe that aggressive feelings should be expressed. 1 2 3 4 5
3. I have sensations of burning, tingling, or crawling in certain parts of my body. 1 2 3 4 5
4. I believe a great many people exaggerate their misfortune in order to gain the sympathy and help of others. 1 2 3 4 5
5. I feel chilly at temperatures that are comfortable for others. 1 2 3 4 5
6. I am quick to anger. 1 2 3 4 5
7. I believe it is foolish to be nice to those who are inconsiderate. 1 2 3 4 5
8. I have daydreams about hurting someone I don't like. 1 2 3 4 5
9. My feelings are easily hurt. 1 2 3 4 5
10. I am either too hot or too cold and cannot get comfortable at a constant temperature setting. 1 2 3 4 5
11. I have trouble getting my breath, for no special reason. 1 2 3 4 5
12. At elections I vote for men about whom I know very little. 1 2 3 4 5
13. My mouth feels dry. 1 2 3 4 5
14. I like to know some important people because it makes me feel important. 1 2 3 4 5
15. I have feelings of panic for no special reason. 1 2 3 4 5
16. I have pounding headaches in which I can feel a definite beat. 1 2 3 4 5

(cont'd)

Never = 1 Rarely = 2 Sometimes = 3 Fairly often = 4 Nearly always = 5

17. My table manners are not quite as good at home as when I am out in company. 1 2 3 4 5
18. I am a relaxed person. 1 2 3 4 5
19. I clench my teeth when anxious. 1 2 3 4 5
20. I am troubled by discomfort in the pit of my stomach. 1 2 3 4 5
21. I worry about little things. 1 2 3 4 5
22. I have a hard time swallowing. 1 2 3 4 5
23. I laugh at dirty jokes. 1 2 3 4 5
24. I become upset when I have to wait. 1 2 3 4 5
25. My skin becomes painfully sensitive. 1 2 3 4 5
26. I notice my heart pounding. 1 2 3 4 5
27. I feel like beating or smashing things. 1 2 3 4 5
28. I take things hard. 1 2 3 4 5
29. I grind my teeth in my sleep. 1 2 3 4 5
30. I am bothered with blushing. 1 2 3 4 5
31. I gossip. 1 2 3 4 5
32. I have daydreams in which I make a fool of someone who knows more than I do. 1 2 3 4 5
33. I am troubled by tension interfering with my speech. 1 2 3 4 5
34. My finger tips or other extremities become cold. 1 2 3 4 5
35. I become irritable about little things. 1 2 3 4 5
36. I believe we are never really justified in being hostile towards others. 1 2 3 4 5
37. I have pressure headaches in which my head feels as if it were caught in a vise or as if there were a tight band around it. 1 2 3 4 5
38. I read every editorial in the newspaper. 1 2 3 4 5

(cont'd)

Never = 1 Rarely = 2 Sometimes = 3 Fairly often = 4 Nearly always = 5

39. When embarrassed, I break out in a sweat which annoys me greatly. 1 2 3 4 5
40. I take things in stride. 1 2 3 4 5
41. I have trouble with my hand shaking while I write. 1 2 3 4 5
42. I would rather win than lose in a game. 1 2 3 4 5
43. I break out in a sweat which is not the result of heat or physical exertion. 1 2 3 4 5
44. I feel there are situations where one is justified in hurting another person's feelings. 1 2 3 4 5
45. I am troubled with diarrhea. 1 2 3 4 5
46. I have pains in the back of my neck. 1 2 3 4 5
47. I suddenly feel hot all over, without apparent cause. 1 2 3 4 5
48. I think it is wrong to seek revenge since two wrongs don't make a right. 1 2 3 4 5
49. I am troubled with backaches. 1 2 3 4 5
50. I am a nervous person. 1 2 3 4 5
51. In the absence of physical action my heart beats wildly. 1 2 3 4 5
52. I say things that are not completely true. 1 2 3 4 5
53. What others think of me does not bother me. 1 2 3 4 5
54. My hand shakes when I try to do something. 1 2 3 4 5
55. I have stomach trouble. 1 2 3 4 5
56. I go to sleep without thoughts or ideas bothering me. 1 2 3 4 5
57. I feel that might makes right. 1 2 3 4 5
58. My head feels tender to the point that it hurts when I comb my hair or put on a hat. 1 2 3 4 5

(cont'd)

Never = 1 Rarely = 2 Sometimes = 3 Fairly often = 4 Nearly always = 5

59. My sleep is fitful and disturbed. 1 2 3 4 5

60. When someone annoys me, my first impulse is to tell him (her) off. 1 2 3 4 5

61. The muscles in my neck ache as if they were tied in knots. 1 2 3 4 5

62. I feel that people are too much concerned with satisfying their own desires at the expense of others. 1 2 3 4 5

63. I feel that I am about to go to pieces. 1 2 3 4 5

64. I become very angry. 1 2 3 4 5

65. I believe there are times when physical violence can be justified. 1 2 3 4 5

66. I am easily frightened. 1 2 3 4 5

67. I imagine taking revenge on someone I dislike. 1 2 3 4 5

68. I believe that it takes a lot of argument to convince most people of the truth. 1 2 3 4 5

69. I put off until tomorrow what I ought to do today. 1 2 3 4 5

70. I have frightening dreams. 1 2 3 4 5

71. I think of ways to get even with certain people. 1 2 3 4 5

72. I believe nearly anyone would tell a lie to keep out of trouble. 1 2 3 4 5

73. I have trouble with muscles twitching and jumping. 1 2 3 4 5

74. I am bothered by dizziness. 1 2 3 4 5

75. I have met people who were supposed to be experts who were no better than I. 1 2 3 4 5

76. I am bothered with constipation. 1 2 3 4 5

77. I have trouble concentrating. 1 2 3 4 5

Key to Scales

Striated Muscle Tension

3.
11.
19.
22.
25.
29.
33.
37.
41.
46.
49.
54.
58.
61.
73.

Autonomic Anxiety

5.
10.
13.
16.
20.
26.
30.
34.
39.
43.
45.
47.
51.
55.
74.

Feelings of Insecurity

1. (Reverse scoring)
9.
15.
18. (R)
21.
24.
28.
35.
40. (R)
50.
56. (R)
59.
63.
66.
70.

Hostile Feelings

6.
8.
27.
32.
60.
64.
67.
71.

Rejection of Hostility

2. (R)
36.
44. (R)
48.
57. (R)
62.
65. (R)

APPENDIX B

Tables 13 to 25

Table 13

Summary of Analysis of Variance for Self-Ratings on Anxiety: Striated Muscle Tension

Source	df	Sum of squares	Mean square	F ratio
C (Conflict-resolution)	2	20.04	10.02	.179
Error	45	2522.44	56.05	
Total	47	2542.48		

Table 14

Summary of Analysis of Variance for Self-Ratings on Anxiety: Autonomic Anxiety

Source	df	Sum of squares	Mean square	F ratio
C (Conflict-resolution)	2	18.04	9.02	.137
Error	45	2949.94	65.55	
Total	47	2967.98		

Table 15

Summary of Analysis of Variance for Self-Ratings on Anxiety: Feelings of Insecurity

Source	df	Sum of squares	Mean square	F ratio
C (Conflict-resolution)	2	48.04	24.02	.222
Error	45	4863.88	108.08	
Total	47	4911.92		

Table 16

Summary of Analysis of Variance for Sum of Self-Ratings on the Three Anxiety Scales

Source	df	Sum of squares	Mean square	F ratio
C (Conflict-resolution)	2	27.12	13.56	.0253
Error	45	24062.38	534.73	
Total	47	24090.00		

Table 17

Summary of Analysis of Variance for Self-Ratings on Hostility: Hostile Feelings

Source	df	Sum of squares	Mean square	F ratio
C (Conflict-resolution)	2	34.62	17.31	.697
Error	45	1116.63	24.81	
Total	47	1151.25		

Table 18

Summary of Analysis of Variance for Self-Ratings on Hostility: Rejection of Hostility

Source	df	Sum of squares	Mean square	F ratio
C (Conflict-resolution)	2	48.29	24.19	1.697
Error	45	641.38	14.25	
Total	47	689.67		

Table 19

Summary of Analysis of Variance for Performance on Maze-Solving under Stress

Source	df	Sum of squares	Mean square	F ratio
C (Conflict-Resolution)	2	2.2975	1.1487	1.329
O (Order stress-nonstress)	1	2.2452	2.2452	2.598
C x O	2	6.3025	3.1512	3.647*
Error	42	36.2888	.8640	
Total	47	47.1340		

*$p < .05$

Table 20

Summary of Analysis of Variance for Performance on Maze-Solving under Nonstress

Source	df	Sum of squares	Mean square	F ratio
C (Conflict-Resolution)	2	1.05	.52	.592
O (Order stress-nonstres)	1	.2371	.2371	.270
C x O	2	.3319	.1659	.1891
Error	42	36.8343	.8770	
Total	47	38.4533		

Table 21

Summary of Analysis of Variance for Performance on Abstract Thinking under Stress

Source	df	Sum of squares	Mean square	F ratio
C (Conflict-resolution)	2	63.54	31.77	1.975
O (Order stress-nonstress)	1	2.52	2.52	.156
C x O	2	23.04	11.52	.716
Error	42	675.38	16.08	
Total	47	764.48		

Table 22

Summary of Analysis of Variance for Performance on Abstract Thinking under Nonstress

Source	df	Sum of squares	Mean square	F ratio
C (Conflict-resolution)	2	53.53	26.76	3.68*
O (Order stress-nonstress)	1	.18	.18	.0247
C x O	2	43.14	21.57	2.96
Error	42	305.63	7.27	
Total	47	402.48		

*$p < .05$

Table 23

Summary of Analysis of Variance for Performance on Vocabulary under Stress

Source	df	Sum of squares	Mean square	F Ratio
C (Conflict-Resolution)	2	100.54	50.27	1.111
O (Order stress-nonstress)	1	147.00	147.00	3.25
C x O	2	254.63	127.31	2.81
Error	42	1909.75	45.23	
Total	47	2411.92		

Table 24

Summary of Analysis of Variance for Performance on Vocabulary under Nonstress

Source	df	Sum of squares	Mean square	F ratio
C (Conflict-Resolution)	2	38.29	19.14	.528
O (Order stress-nonstress)	1	80.08	80.08	2.210
C x O	2	31.55	15.77	.4352
Error	42	1522.00	36.23	
Total	47	1671.92		

Table 25

Group Means for Males and Females

on Anxiety and Hostility Scales

Scale		Conflict-Resolution		
		Good	Medium	Poor
Striated Muscle Tension	Male	25.10	26.10	22.60
	Female	23.83	29.50	28.83
Autonomic Anxiety	Male	28.90	26.70	28.20
	Female	28.50	34.00	33.66
Feelings of Insecurity	Male	39.00	37.00	38.10
	Female	41.50	42.17	36.50
Sum of Anxiety Scales	Male	93.00	89.80	88.90
	Female	93.83	105.66	99.00
Hostile Feelings	Male	17.80	17.00	18.30
	Female	18.50	20.66	13.33
Rejection of Hostility	Male	22.20	25.10	23.40
	Female	23.50	24.83	26.50

APPENDIX C

Raw Data

Minutes to Solution of Mazes

Stress Presented Last			Stress Presented First		
(S No.)	Nonstress	Stress	(S No.)	Nonstress	Stress
Good Conflict-Resolution Group					
(1)	1.96	2.35	(9)	1.26	1.32
(2)	3.81	2.17	(10)	2.66	2.21
(3)	1.97	2.06	(11)	3.73	3.82
(4)	2.94	2.27	(12)	3.60	3.49
(5)	2.31	2.59	(13)	1.79	1.42
(6)	1.79	1.90	(14)	1.73	3.13
(7)	1.61	2.06	(15)	1.77	3.04
(8)	4.69	3.30	(16)	1.95	2.85
Medium Conflict-Resolution Group					
(17)	3.39	2.21	(25)	2.03	3.80
(18)	2.58	3.88	(26)	1.70	2.40
(19)	2.06	2.03	(27)	1.62	1.57
(20)	1.58	2.06	(28)	3.88	3.22
(21)	1.69	1.78	(29)	2.00	1.91
(22)	1.80	1.74	(30)	1.97	2.09
(23)	3.67	3.06	(31)	2.13	1.75
(24)	1.68	2.91	(32)	1.89	1.67
Poor Conflict-Resolution Group					
(33)	3.40	2.46	(41)	4.34	6.30
(34)	1.78	1.69	(42)	3.40	3.77
(35)	2.86	2.93	(43)	2.60	3.23
(36)	1.60	1.36	(44)	2.04	2.32
(37)	1.88	2.40	(45)	1.52	2.60
(38)	1.98	1.34	(46)	2.41	3.48
(39)	4.85	3.45	(47)	2.40	3.63
(40)	1.86	1.99	(48)	2.41	3.25

Number of Abstract Thinking Items Correct

Stress Presented First		Stress Presented Last	
Nonstress	Stress	Nonstress	Stress
Good Conflict-Resolution Group			
(S No.)		(S No.)	
(1) 21	12	(9) 19	15
(2) 17	10	(10) 19	16
(3) 14	11	(11) 21	19
(4) 20	17	(12) 18	11
(5) 19	14	(13) 14	11
(6) 21	12	(14) 18	14
(7) 23	17	(15) 17	10
(8) 15	11	(16) 18	19
Medium Conflict-Resolution Group			
(17) 16	7	(25) 19	8
(18) 17	15	(26) 23	20
(19) 21	17	(27) 15	10
(20) 17	12	(28) 22	9
(21) 22	18	(29) 23	17
(22) 21	7	(30) 19	10
(23) 14	5	(31) 23	17
(24) 14	10	(32) 21	12
Poor Conflict-Resolution Group			
(33) 19	17	(41) 10	5
(34) 12	12	(42) 12	7
(35) 18	10	(43) 13	11
(36) 22	19	(44) 17	12
(37) 19	12	(45) 20	13
(38) 15	9	(46) 18	10
(39) 17	3	(47) 21	10
(40) 19	11	(48) 16	13

Number of Vocabulary Items Correct

(S No.)	Stress Presented First		(S No.)	Stress Presented Last	
	Nonstress	Stress		Nonstress	Stress
Good Conflict-Resolution Group					
(1)	23	19	(9)	30	30
(2)	20	22	(10)	38	32
(3)	25	17	(11)	36	34
(4)	28	21	(12)	32	27
(5)	24	12	(13)	23	19
(6)	30	20	(14)	29	18
(7)	22	15	(15)	27	31
(8)	21	12	(16)	17	22
Medium Conflict-Resolution Group					
(17)	34	32	(25)	27	19
(18)	18	15	(26)	26	29
(19)	27	22	(27)	30	25
(20)	27	16	(28)	26	20
(21)	27	29	(29)	25	30
(22)	15	10	(30)	17	20
(23)	35	36	(31)	23	17
(24)	15	8	(32)	35	32
Poor Conflict-Resolution Group					
(33)	12	9	(41)	20	15
(34)	20	21	(42)	18	11
(35)	23	23	(43)	27	18
(36)	25	23	(44)	34	26
(37)	26	13	(45)	25	11
(38)	21	22	(46)	29	26
(39)	34	32	(47)	21	15
(40)	28	18	(48)	27	16

Self-Ratings

S No.	AA*	SMT	FI	Sum A	HF	HR
	(Good Conflict Resolution)					
1	24	20	28	72	16	23
2	27	21	35	83	16	26
3	15	18	27	60	11	22
4	30	26	40	96	18	25
5	30	17	40	87	14	23
6	30	24	33	87	16	23
7	21	18	33	72	17	22
8	30	27	54	111	22	22
9	19	19	38	76	18	22
10	37	38	59	134	26	18
11	38	33	56	127	20	22
12	40	35	48	123	22	23
13	27	28	35	90	13	21
14	34	22	27	83	19	24
15	26	17	60	103	24	25
16	32	21	26	79	17	22
	(Medium Conflict Resolution)					
17	27	25	35	87	16	25
18	29	25	35	89	22	23
19	36	29	51	116	32	24
20	38	31	38	107	17	30
21	31	29	41	101	16	21
22	22	20	34	76	19	23
23	55	49	63	167	28	23
24	26	23	26	75	10	31
25	33	26	46	105	21	23
26	16	19	29	64	16	18
27	33	29	38	100	23	21
28	24	20	27	71	12	27
29	25	21	27	73	12	28
30	17	23	42	82	19	24
31	23	19	40	82	18	29
32	36	30	51	117	13	30

* AA = Autonomic Anxiety
SMT = Striated Muscle Tension
FI = Feelings of Insecurity
Sum A = Sum of Anxiety scales
HF = Feelings of Hostility
HR = Rejection of Hostility

Self-Ratings (Continued)

S No.	AA	SMT	FI	Sum A	HF	HR
			(Poor Conflict Resolution)			
33	24	19	32	75	11	25
34	39	37	39	115	21	23
35	41	33	44	118	12	27
36	36	34	47	117	15	31
37	29	23	27	79	20	27
38	43	32	50	125	27	16
39	35	35	46	116	16	25
40	22	16	32	70	16	18
41	26	22	25	73	10	29
42	23	17	33	73	12	22
43	37	27	33	97	10	30
44	23	17	44	84	18	17
45	30	17	49	96	21	28
46	25	15	31	71	22	18
47	17	17	23	57	15	30
48	34	38	45	117	17	27