71-1507

THORNTON, Jerry Wayne, 1942-
LEARNED HELPLESSNESS IN HUMANS.

The University of Oklahoma, Ph.D., 1970
Psychology, experimental

University Microfilms, A XEROX Company, Ann Arbor, Michigan

THE UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

LEARNED HELPLESSNESS IN HUMANS

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

degree of

DOCTOR OF PHILOSOPHY

BY

AYNE

JERRY W. THORNTON

Norman, Oklahoma

1970

LEARNED HELPLESSNESS IN HUMANS

APPROVED BY

Paul H. Jacobs

Larry E. Toothaker

N. Jack Kanak

Thomas M. Miller

DISSERTATION COMMITTEE

ACKNOWLEDGEMENTS

The author wishes to acknowledge his appreciation to Dr. Paul D. Jacobs, the Dissertation Committee Chairman, for his patience in overlooking other assistantship tasks while this research was ongoing, and for his helpful suggestions through the duration of this endeavor.

Special appreciation goes to Dr.'s Jack Kanak, Larry Toothaker and Tom Miller who contributed to the theory and analysis of this report and who in their critical reading helped to improve its quality.

The author is especially indebted to his wife for the patience and understanding she maintained throughout the past graduate years. Certainly without her understanding and willingness to sacrifice, this could not have been achieved.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LEARNED HELPLESSNESS IN HUMANS

INTRODUCTION

In a recent review of the literature on uncontrollable aversive events, Seligman, Maier, & Solomon (1969) maintain that not only can Ss learn that a particular response controls reinforcement but are also capable of learning that they cannot control reinforcement, a phenomenon Seligman & Maier (1967) have labelled learned helplessness.

The primary concern of the present study with uncontrollable stress involves the outcomes of a situation where S is first given training trials under inescapable/ unavoidable shock, followed by test trials where escape/ avoidance is possible. There have been a variety of experiments utilizing this procedure, e.g., where the nature of the inescapable shocks differ (Overmier & Seligman, 1967; Seligman & Maier, 1967), differing situations in which the shocks are given (Anderson, Cole, McVaugh, and Taylor, 1968; Braud, Wepman, & Russo, 1969; Pickney, 1967), variable time between the inescapable shock and escape/ avoidance responses (Overmier & Seligman, 1967; Seligman & Maier, 1967), and differing species (Braud *et al.*, 1969;

Pickney, 1967; Seligman & Maier, 1967; Thornton, Levy & Jacobs, 1969). Despite the multiplicity of experimental procedures a consistent picture of helplessness emerges.

Probably the most used test situation has been the two way shuttle-box. Overmier & Seligman (1967) and Seligman & Maier (1967) administered training trials of inescapable shock to one group of harnessed dogs and training trials of escapable shock to another group. When both groups were transferred to test trials of escape/ avoidance shuttling, the group who initially received inescapable shock was severely retarded in dealing with later escapable shock.

This phenomenon was reproducible with a variety of frequencies, densities, durations, and temporal distributions of inescapable shock. Maier, Seligman, & Solomon (1968) reported that the effect occurs whether or not the inescapable shock is preceded by a signal. Similar results are reported by Carlson & Black (1960), and Overmier & Leaf (1965).

A second test situation, which is utilized in the present study, involves escape/ avoidance by manipulation (e.g., bar press, wheel turn, etc.). Dinsmoor & Campbell (1956a) with rats and Seward and Humphreys (1967) with fish reported that Ss who initially received inescapable shock training were slower to make their first escape and slower to acquire a stable escape response than were the non-shocked Ss.

The S may be immunized against the effect by first training with escapable preshock (Maier et al., 1968), however, once the phenomenon has been established, a therapeutic procedure of forced responding will break it up (Seligman, Maier, & Greer, 1967).

Literature on unavoidable preshock in humans is nonexistent. An unpublished pilot study (Thornton et al., 1969) testing the helplessness phenomenon in humans, performing under mild stress, was non-supportive of Seligman's hypothesis. Therefore, in the present investigation it is hypothesized that a minimum level of stress must exist and that this stress should be perceptually constant throughout training trials.

The traditional stress-set instructions inform S that he will be allowed to adjust his shock level to an unpleasant but not painful level. The traditional instructions (a) allow S to define the situation for himself (i.e., shock will never be any worse than the highest level he has set), and (b) tend to allow S to set a superficially "unpleasant" intensity level, e.g., Thornton et al., (1969) noted that several Ss reported to have set a level far below what they, two or three shocks later, felt was unpleasant.

The key problem with the traditional instructions would appear to be that S, after adjusting the shock level, gains predictability concerning the shock intensity, a situation noted as decreasing the stressed state (D'Amato & Gumenik, 1960; and Pervin, 1963).

Non-traditional instructions are categorized into two sub-types; (a) those setting a constant level of shock, and (b) those setting a subjective level of shock and then increasing it. The former invites stress adaptation while the latter most likely allows for differential stress levels due to "arbitrarily" increasing the shock level.

In the present experiment a new technique for instructional stress-set was introduced which includes a stressor combination; threat of shock combined with actual shock delivery. The new instructions (involving a random delivery of high to low shock intensity) are an attempt to (1) reduce the possibility that S would define the stress level from the outset (i.e., choose a low level) and thus, early in trials, dissipate the stressed state, (2) reduce expectation resulting from a constant shock level which would act to facilitate adaptation, and (3) reduce predictability S might have over shock intensity.

The present study, utilizing this new instructional stress set with human Ss, is an attempt to replicate Seligman & Maier's (1967) results, thus bringing the helplessness therapy procedure (Seligman, 1969) closer to realization.

The present investigation utilized eight groups given 30 training reaction time (RT) trials followed by 10 test trials. Four groups were given the traditional instructions and consisted of one group who initially received escapable shock (E_1), a second group who initially received inescapable, yoked shock (Y_{11}), i.e., Y Ss received the same shock as E Ss, a third group who performed no task but received inescapable, yoked shock (Y_{21}), and a fourth group who performed the task and received no shock (C_1). The second four groups consisted of the same contingency groups but were given the new shock instructions and carried a subscript of "2" (e.g., E_2, Y_{12}, Y_{22}, & C_2, respectively).

The Perceived Stress Index (PSI) (Jacobs and Munz, 1968) was administered before trial 1 (PSI_1), after trial 15 (PSI_2), and after trial 30 (PSI_3) to analyze for differences in perceived stress states in each instructional set.

Based on the literature review and the original pilot study, the following hypotheses were tested. In acquisition trials the following predictions were made in reference to RT scores; (1) $E_1 > E_2$, $Y_{11} < Y_{12}$, $C_1 = C_2$. In test trials the following predictions were made; (1) the traditional instructions would produce no support for the learned helplessness hypothesis, i.e., $E_1 = Y_{11} = Y_{21} = C_1$; (2) the new instructions would support the learned helplessness hypothesis, i.e., $E_2 < Y_{12}=Y_{22}=C_2$; and (3) further nonsupport for the learned helplessness hypothesis with the traditional instructions and support for the hypothesis with the new instructions would be manifest by $E_1 > E_2$, $Y_{11} < Y_{12}$, $Y_{21} < Y_{22}$, $C_1=C_2$. Predictions from the PSI scores were as follows; (1) the traditional instruction scores would be less stressful than the new instruction scores, (2) in traditional instructions $PSI_1 < PSI_2 = PSI_3$ (i.e., $<$ means more stressful), and (3) in new instructions $PSI_1=PSI_2 \leq PSI_3$.

METHOD AND PROCEDURE

Subjects.--The Ss were 80 introductory psychology volunteers at the University of Oklahoma who were randomly divided into one of two instructional set groups and then assigned on the basis of PSI base scores (administered in the class before the study was described or volunteers taken) to the four shock contingency groups. Blocking consisted of assigning Ss to groups so that each group was homogeneous in respect to perceived stress.

Apparatus.--The apparatus consisted of two separate and distinctively different units: each unit used for a different phase of the experiment.

The training apparatus were located in three distinctly separate rooms each of which contained identical choice reaction time (CRT) units. Each unit consisted of a display board on which was located, at the top, a yellow warning light followed by three horizontal green stimulus lights. _S_'s manipulandum was a panel containing three buttons each of which correctly corresponded to the stimulus lights. A button in front of the stimulus buttons served the purpose of insuring _S_'s hand would be in a consistent place preceding a trial. In two of the three rooms, and in a fourth, ½ in. silver electrodes were used. The fourth room contained only a chair and electrodes (no apparatus).

The test apparatus consisted of four distinctly separate rooms each of which contained identical tasks. The test-task apparatus consisted of an 8 in. square box on which was located a light surrounded by seven white buttons. Depression of both the first and fifth buttons in any fashion broke all circuits (i.e., light, shock, and clock). Silver electrodes were located in all four test rooms.

Shock, generated by a Grayson-Stadler 350 V constant current shock apparatus, was delivered in training trials for 1. sec. duration with no partial shock possible and in test trials for 3. sec. constant with partial shock possible. RT was recorded by four standard timers (1/100 of a sec.).

Procedure.--Upon entering the laboratory _S_s were assigned to rooms according to the PSI assignment variable. After electrodes were attached to the under side of the arm, 3. in. below the elbow, _S_s were played a tape recording of instructions.

First, general instructions to the task informed all _S_s their task was to depress the correct button corresponding to the onset of the correct stimulus light. The second instruction informed E_1 & E_2 _S_s to the contingency between shock and slow or incorrect responding, and Y_{11} & Y_{21} _S_s that they would receive inescapable shock, unrelated to their task. The third instructions informed _S_s about the shock they would be receiving (traditional or new instructions). _S_s in groups Y_{12} & Y_{22} were asked to remain seated while being administered several inescapable shocks.

If traditional instructions were employed shock levels were set for each _S_. The new instructions, however, involved a random delivery of shock over the following continuum: .8, 1.3, 1.6, 2.0, & 2.5 ma.

Following instructions a PSI was administered before trial 1, after trial 15, and after trial 30.

Following the third PSI, _S_s were individually moved to the test rooms, electrodes were attached, and _S_s were informed that they would be receiving several shocks, in accordance with the shock instructions, during the following minutes. They could not be told anything about the task before them. If a traditional instruction group was being run, C_1 Ss were allowed first to adjust their shock level.

Ten test trials followed which consisted of 2 sec. of CS (light) alone, overlapping 3 sec. of US (constant shock). Any response over 5 sec. was recorded as 5 sec. A response latency $\leq$ 2 sec. avoided shock for any of the four groups, while any response $> 2 < 5$ sec. resulted in shock for that partial duration. To avoid expectation responding, random schedules of stimulus light occurrences and intra and intertrial intervals were used.

Before Ss were dismissed they were asked (1) how they thought they performed the task, and (2) if they did not respond, why not?

RESULTS

Training trials.--Dunn's multiple comparison procedure revealed no differences in RT scores between E_1, Y_{11}, & C_1; whereas, $E_2 < Y_{12} = C_2$ ($p. < .01$). The t-ratios for *a priori* orthogonal comparisons revealed $E_1 > E_2$ (t $(54) = 3.61$, $p. < .01$), $Y_{11} < Y_{12}$ ($t(54) = 2.42$, $p. < .01$), and $C_1 = C_2$.

Test trials.--Table 1 gives mean RT's and standard deviations of the 8 shock contingency groups. A 2 X 4 ANOVA (Table 2) revealed a nonsignificant A

Table 1

Test Trial Means and Standard Deviations for the Shock Contingency Groups

	Traditional Instructions				New Instructions			
	E_1	Y_{11}	Y_{21}	C_1	E_2	Y_{12}	Y_{22}	C_2
$\overline{X}$	3.48	4.15	4.55	4.46	2.81	4.66	4.95	4.90
SD	.77	.58	.35	1.28	.96	.44	.40	.32

Table 2

Summary of the Two-Way Analysis of Variance of Test Trial Latency Scores

	df	MS	F
Instructions (A)	1	.59	NS
Shock contingency (B)	3	11.21	19.33**
A X B	3	1.58	2.78*
Error	72	.58	
Total	79		

*_p_. < .05

**_p_.<.01

(instruction) main effect ($p > .25$), but a significant B (shock contingency) main effect, $F(3,72)=19.33$, $p < .01$, and an A X B interaction $F(3,72)=2.78$, $p < .05$ (see Figure 1). Due to the significant A X B interaction, a simple main effects analysis was conducted to separately assess the variance at each level of each factor. The results revealed significance of A at b_1 (escapable shock), ($p < .05$), B at a_1 (traditional instructions), ($p < .05$), and B at a_2 (new instructions, ($p < .01$). To further assess the significance of the B factor, a Scheffe *S* test was conducted on each level of B at each level of A. The A_1 analysis revealed $\bar{X}_{E_1} < \bar{X}_{Y_{21}}$ ($p < .05$) with all other comparisons nonsignificant. The A_2 analysis revealed $\bar{X}_{E_2} < \bar{X}_{Y_{12}} = \bar{X}_{Y_{22}} = \bar{X}_{C_2}$ ($p < .01$), while all other comparisons were nonsignificant. The *t*-tests for *a priori* orthogonal comparisons on latency measures yielded the following comparisons: $\bar{X}_{E_1} > \bar{X}_{E_2}$ ($t=1.97$, $df=72$, $p < .05$), while all other comparisons were nonsignificant.

Figure 2 shows the group trends across the 10 trials.

PSI results.--A 2 X 4 X 3 mixed ANOVA (Table 3) was conducted on the PSI scores (a repeated measure). Results revealed a significant A (instructions) main effect ($p < .01$), B (shock contingency) main effect ($p < .05$), and C (PSI score) main effect ($p < .01$); while no interactions approached significance. A Scheffe's *S*

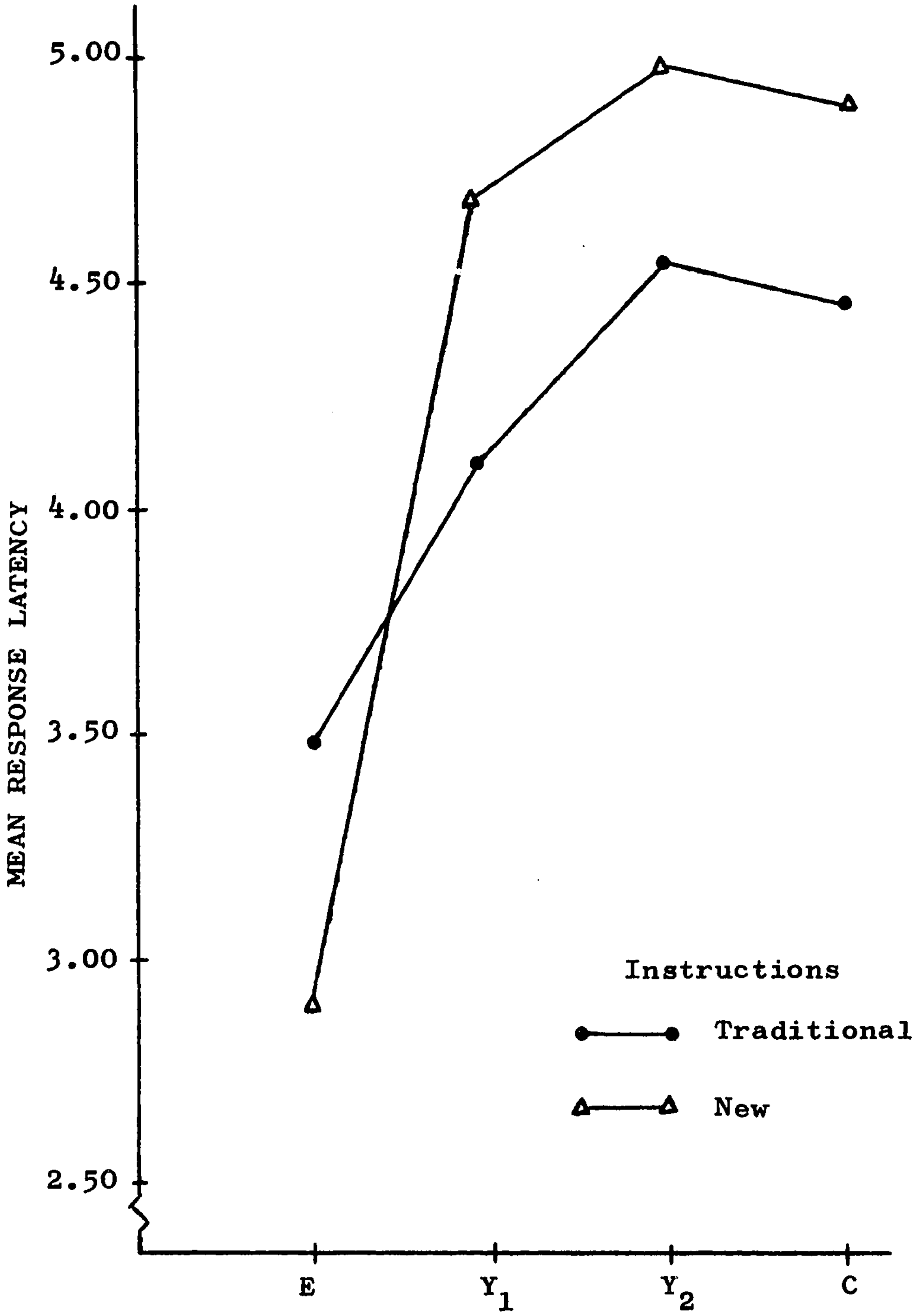

Fig. 1. A (instructions) X B (shock contingency) interaction of the learned helplessness test trials.

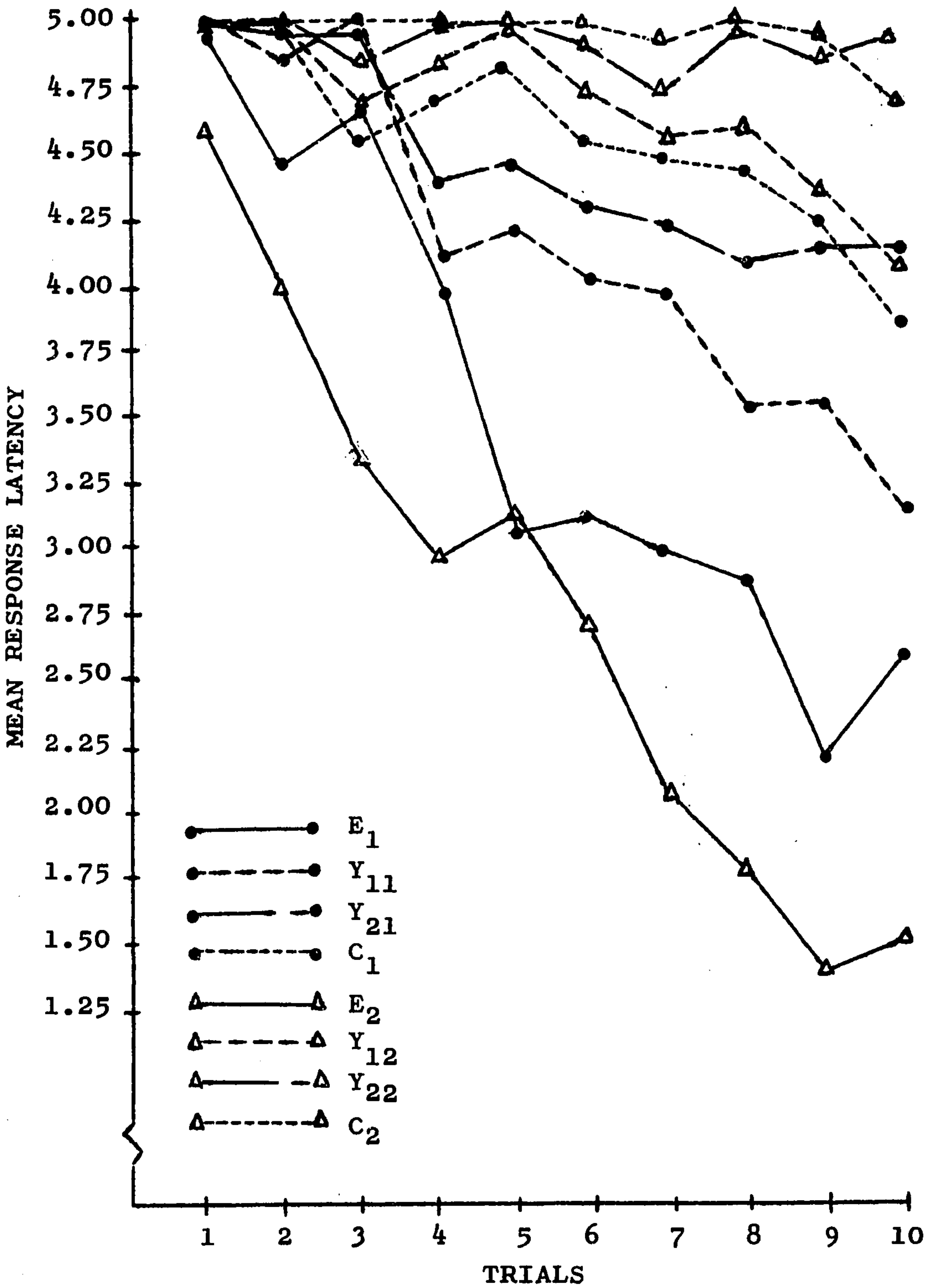

Fig. 2. Graph of the 10 escape/ avoidance test trials for the eight shock contingency groups.

Table 3

Summary of the Three-Way Repeated Measures
Analysis of Variance for PSI Scores

	df	MS	F
Between subjects	79		
Instructions (A)	1	33.16	10.02**
Shock contingency (B)	3	13.32	3.24*
A X B	3	1.51	NS
Subjects within groups	72	4.11	
Within subjects	160 X 1/2=80[a]		
PSI (C)	2 X 1/2= 1[a]	33.93	10.25**
A X C	2 X 1/2= 1[a]	3.21	NS
B X C	6 X 1/2= 3[a]	2.89	NS
A X B X C	6 X 1/2= 3[a]	4.04	1.23
C X Subjects within groups	144 X 1/2=72[a]	3.31	

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

(a) The degrees of freedom for the within subjects variables have been corrected for heterogeneity of variances and covariances.

test, conducted on the B main effect to determine the relations between shock contingency means, revealed that $\overline{X}_E=\overline{X}_{Y_1}=\overline{X}_{Y_2} > \overline{X}_C$ ($p. < .05$). The *t*-tests for dependent measures conducted on the C main effect revealed $PSI_1 <$ PSI_2 ($p. < .05$), and $PSI_2 < PSI_3$ ($p. < .05$). Figure 3 shows the repeated PSI scores over the 8 groups.

An analysis of the shock intensity (milliamperes) administered per group in training trials revealed that $E_1=Y_1 > E_2=Y_2$ ($p. < .01$).

DISCUSSION

The present investigation was successful in supporting its primary objectives. Learned helplessness has been substantiated in humans and a new technique for creating an instructional stress set has been validated.

Training trials.--The analyses of the training trials yielded support for the first hypothesis (i.e., $E_1 > E_2$, $Y_{12} > Y_{11}$, & $C_1=C_2$), indicating the validity of the new instructions. Dunn's procedure for shock contingency groups given traditional instructions yielded no differences; whereas, groups given new stress instructions differed, i.e., $E_2 < Y_2=C_2$. These differences should only be attributable to the instructions, since this was the only differing factor. The results suggest that the traditional instructions were less stress

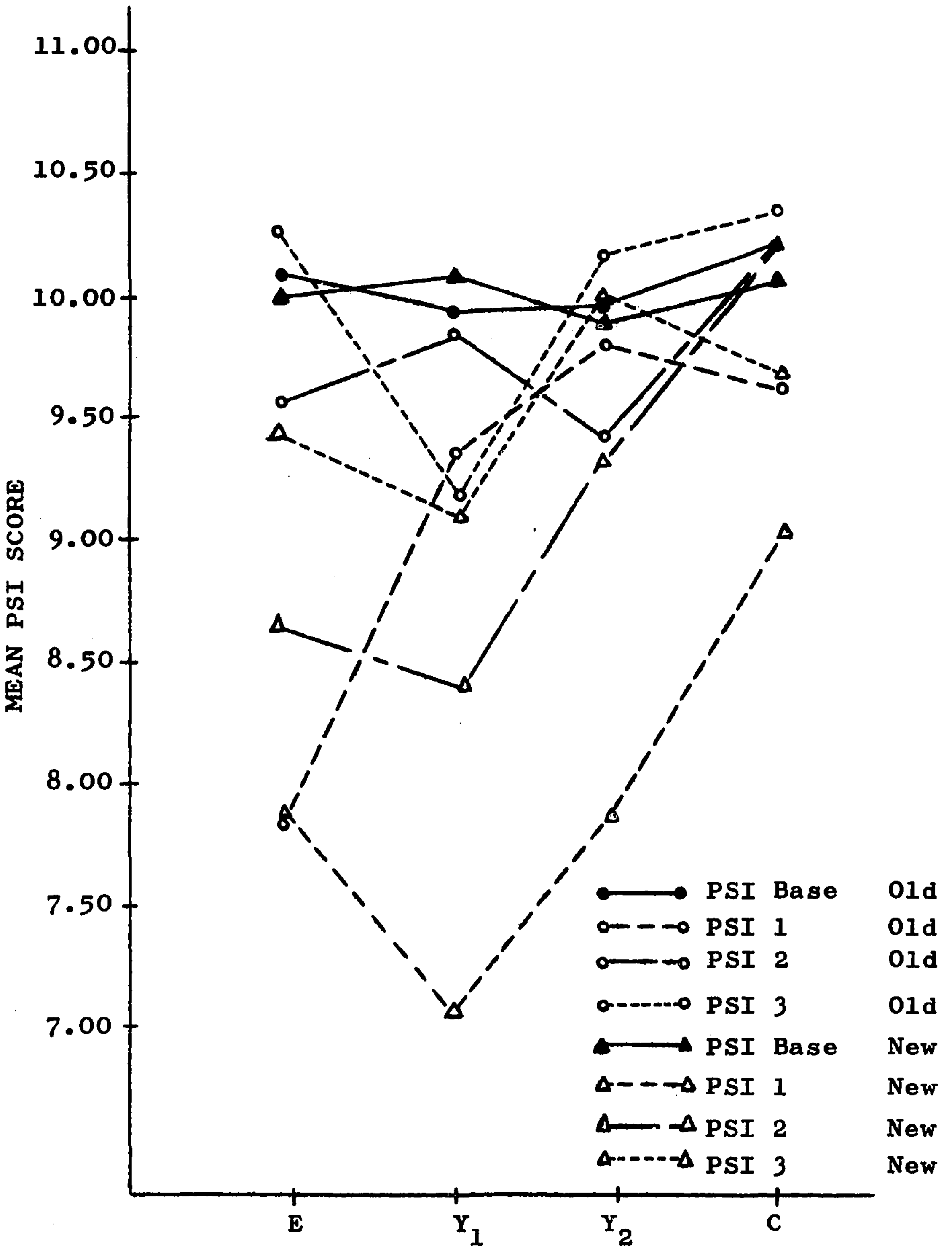

Fig. 3. Graph of the repeated PSI scores plotted across shock contingency groups.

provoking and less motivating to E_1 Ss, and less interfering to Y_{11} & Y_{21} Ss, than were the new instructions. The new stress instructions appeared to have significantly facilitated E_2 S's performance (in order to avoid shock) and significantly decreased Y_{12} & Y_{22} S's performance (due to interference from unpredictable shock).

Although several studies have shown supportive evidence for facilitated task performance using traditional instructions (e.g., Jacobs & Kirk, 1969; Thornton & Jacobs, 1970), a number of studies report inhibited performance (e.g., Craig, 1966; Freedman, 1966; Nash, Phelan, Demas, & Bittener, 1966). It is felt that much of the apparent contradiction in stress research might be reduced if instructions conforming to the present study's new instructions were utilized.

Test trials.--The validity of the new instructions becomes increasingly evident upon examination of the test trial results. The ANOVA revealed a nonsignificant instruction main effect; however, this was expected since an interaction with shock contingency groups was predicted.

The Scheffe's S analysis performed on the levels of shock contingency for each instruction level revealed, for the traditional instructions, $\bar{X}_{E_1} < \bar{X}_{Y_{21}}$ ($p < .05$), with all other comparisons nonsignificant (i.e., nonsupportive of the helplessness hypothesis); while for the new instructions, $\overline{X}_{E_2} < \overline{X}_{Y_{12}} = \overline{X}_{Y_{22}} = \overline{X}_{C_2}$ (i.e., supportive of the helplessness hypothesis). Thus both test trial hypotheses, two and three, were supported.

Lack of support for the helplessness hypothesis with the traditional instructions and the support for the hypothesis with the new instructions lends credence to the earlier stated hypothesis that a certain level of stress must be present in training trials and that this stress level should be perceptually constant across trials. This finding appears slightly at variance with Seligman et al.'s (1969) general statement that it is not the stress which causes the helplessness phenomenon but the learning of independence of responding and reinforcement. Although the helplessness phenomenon does depend upon the learning of such independence, the present study indicates that consideration must also be given to the level of stress under which S performs. The importance of the new instructions clarify the pilot study's (Thornton et al., 1969) failure to support the helplessness hypothesis.

The third test trial hypothesis was substantiated by the finding (i.e., $\overline{X}_{E_1} > \overline{X}_{E_2}$, $\overline{X}_{Y_{21}} = \overline{X}_{Y_{22}}$, $\overline{X}_{C_1} = \overline{X}_{C_2}$) which indicates that the new instructions were more stress provoking than were the traditional instructions. The $\overline{X}_{Y_{11}}$ vs. $\overline{X}_{Y_{12}}$ comparison, although nonsignificant at the α .05 level, produced a strong trend ($p < .075$) which suggests that the new instructions also significantly influenced this group's performance.

Since the second and third PSI hypotheses were predictions of an AC interaction (nonsignificant) they were not supported. The significant instruction effect does, however, support the first hypothesis in that the new instructions produced more stressful reports over the three repeated PSIs than did the traditional instructions. The Scheffe's S test, conducted to augment the significant shock contingency effect, resulted in the following mean order: $\overline{X}_{Y_1} < \overline{X}_E < \overline{X}_{Y_2} < \overline{X}_C$, which suggests that the PSI was sensitive to detecting the interference created by the learned helplessness state.

One further aspect which increases the validity of the new instructions is that E_2 and Y_{12} Ss received approximately half the US (millamperes) intensity (i.e., 181 ma per group) that E_1 (339 ma per group) and Y_{11} (341 ma per group) received, and yet the new instruction group's performance was more indicative of higher stress.

Some important relationships between Seligman's work with dogs and the present investigation are notable. Seligman et al., (1969) reported that in test trials dogs who received subsequent inescapable shock training made no attempt to escape or avoid. In the present study it was noted, by latency measures and post session interviews, with the traditional instructions approximately

28% of all Y_{11}, Y_{21}, & C_1 Ss failed to make a response during any of the 10 trials; whereas, with new instructions approximately 65% of all Y_{12}, Y_{22}, & C_2 Ss failed to make at least one response. These post hoc analyses further suggest that the new instructions increased the interfering effect of learned helplessness.

When asked why they did not respond, approximately 60% of Ss in all Y groups reported that they felt they had no control over shock, so why try. These Ss reported that they spent the majority of their time in preparation for the upcoming shock. Approximately 35% reported that they, after pushing one or two buttons, abandoned the idea of escape. The other 5% gave no reason for response failure. All Ss in both E_1 & E_2 groups learned the task within four trials; however, after the sixth trial only 10% of E_1 Ss were avoiding, while 84% of E_2 Ss were avoiding. In post interviews, when E_1 & E_2 Ss were asked how well they performed the task, more than 70% reported they felt that they had control over shock, as in subsequent trials, and their task was to find out how. Thus the performance of E_1 & E_2 Ss reflect similar behavior as Seligman and Maier's (1967) dogs.

On several occasions a Y_1 or Y_2 S would escape or avoid shock on one trial, but on the following trials, again take the full three sec. shock. It appeared that these Ss did not associate their responding with the reinforcement (i.e., the helplessness state was maintained). Seligman _et al_. (1969) report nearly identical results with dogs.

The implications of the present study are vast. Foremost, learned helplessness has been established in humans. Seligman's (1969) latest work has hypothesized a "therapy" for schizophrenics, utilizing knowledge of learned helplessness. The present investigation hopefully brings the helplessness "therapy" closer to reality. The present study's heuristic value lies in the fact that there are many parameters which now must be investigated with human _S_s, e.g., stressor generalization, immunization, alleviation, etc.

In conclusion, it is hoped that anyone who conducts research in stress will consider using the new instructions, developed herein, as a means of possibly eliminating the accumulation of confusing and contradicting stress reports.

REFERENCES

Anderson, D.C., Cole, J., & McVaugh, W. Variations in unsignalled, inescapable preshock as determinants of responses to punishment. Journal of Comparative and Physiological Psychology, 1968, 65, 342-346.

Braud, W., Wepman, B., & Russo, D. Task and species generality of the "helplessness" phenomenon. Psychonomic Sciences, 1969, 16, 154-155.

Carlson, N.J. & Black, A.H. Traumatic avoidance learning: The effects of preventing escape responses. Canadian Journal of Psychology, 1960, 14, 21-28.

Craig, E.A. Situational stress and safety. Personnel Journal, 1966, 45, 269-272.

D'Amato, M. & Gumenik, W. Some effects of immediate versus randomly delayed shock on an instrumental response and cognitive processes. Journal of Abnormal and Social Psychology, 1960, 60, 64-67.

Dinsmoor, J.A. & Campbell, S.L. Level of current and time between sessions as factors in "adaptation" to shock. Psychological Reports, 1956, 2, 43-49 (a).

Freedman, P.E. Human maze learning as a function of stress and partial reinforcement. Psychological Reports, 1966, 18, 975-981.

Jacobs, P.D. & Munz, D.C. An index for measuring perceived stress in a college population. The Journal of Psychology, 1968, 70, 9-15.

Jacobs, P.D. & Kirk, R.E. Effects of "task-related stress" on human performance on a two-component monitoring task. Perceptual and Motor Skills, 1969, 29, 815-823.

Maier, S.F., Seligman, M.E.P., & Solomon, R.L. Pavlovian fear conditioning and learned helplessness. In

Campbell, B.A. & Church, R.M. Punishment. New York: Appleton-Century-Crofts, 1968.

Nash, E., Phelan, J., Demas, G., & Bittner, A. Effects of manifest anxiety and induced anxiety and experimental variability on simple reaction time. Perceptual and Motor Skills, 1966, 22, 483-487.

Overmier, J.B. & Leaf, R.C. Effects of discriminative Pavlovian fear conditioning upon previously or subsequently acquired avoidance responding. Journal of Comparative and Physiological Psychology, 1965, 60, 213-217.

Overmier, J.B. & Seligman, M.E.P. Effects of inescapable shock upon subsequent escape and avoidance responding. Journal of Comparative and Physiological Psychology, 1967, 63, 28-33.

Pervin, L.A. The need to predict and control under conditions of threat. Journal of Personality, 1963, 31, 570-585.

Pickney, G. Avoidance learning in fish as a function of prior fear conditioning. Psychological Reports, 1967, 20, 71-74.

Seligman, M.E.P. Can we immunize the weak. Psychology Today, June, 1969, 42-44.

Seligman, M.E.P. & Maier, S.F. Failure to escape traumatic shock. Journal of Experimental Psychology, 1967, 74, 1-9.

Seligman, M.E.P., Maier, S.F., & Greer, H.G. Alleviation of learned helplessness in the dog. Journal of Abnormal Psychology, 1968, 73, 256-262.

Seligman, M.E.P., Maier, S.F., & Solomon, R.L. Unpredictable and uncontrollable aversive events. In Brush, F.R., Aversive Conditioning and Learning. Academic Press, 1969.

Seward, J.P. & Humphrey, G.L. Avoidance learning as a function of pretraining in the cat. Journal of Comparative and Physiological Psychology, 1967, 63, 388-391.

Thornton, J.W. & Jacobs, P.D. Analysis of task difficulty under varying conditions of induced stress. Perceptual and Motor Skills, (in press).

Thornton, J.W., Levy, L., & Jacobs, P.D. Interference of "learned helplessness" in humans: A pilot study. (unpublished data), 1969.

APPENDICES

APPENDIX I

PROSPECTUS

APPENDIX I

DISSERTATION PROSPECTUS

LEARNED HELPLESSNESS IN HUMANS

Seligman in a recent article (Seligman, Maier, & Solomon, 1969) states that learning theorists have traditionally viewed the relations between instrumental responding and outcomes to which S is sensitive as being described by a line depicting the conditional probability of a reinforcement following a response. The hypothetical line varies from 0 to 1, with 1 representing an instance where every response produces a reinforcement (continuous); 0 representing an instance where a response never produces reinforcement (extinction); and intermediate points representing instances of partial reinforcement.

Seligman, in light of recent investigations (mentioned later in this paper) with uncontrollable stress, maintains that a simple line as described above is an inadequate description of the relationships between response and outcomes to which S may be sensitive, e.g., important events often occur even when there has been no response. Seligman et al. (1969) maintain that a better description of instrumental training would involve a two dimensional space represented in one plane by the traditional dimension (i.e., conditional probability of reinforcement following a response), and in the other by the conditional probability of a reinforcement given the absence of that response (see Figure 4). Considering the points in the space which fall along the 45° line (i.e., uncontrollability); whether or not S responds, he still experiences the same density of reinforcement. That is, the conditional probability of reinforcement, given a specific response, does not differ from the conditional probability of reinforcement in the absence of that response, as such, responding and reinforcement are said to be independent. When the response will not change the reinforcement of S, the response and reinforcement are independent. Thus dependence and independence of response and reinforcement bear a close relationship to the controllability and uncontrollability of S over the situation. Hence, Seligman et al.'s (1969) major point is that not only can Ss learn that a particular response controls reinforcement but also Ss are capable of learning that they cannot control reinforcement, i.e., S can learn about conjoint variations along both dimensions.

Seligman et al. (1969) in drawing a relationship between predictability and controllability state that feedback from a response is potentially a stimulus, i.e.,

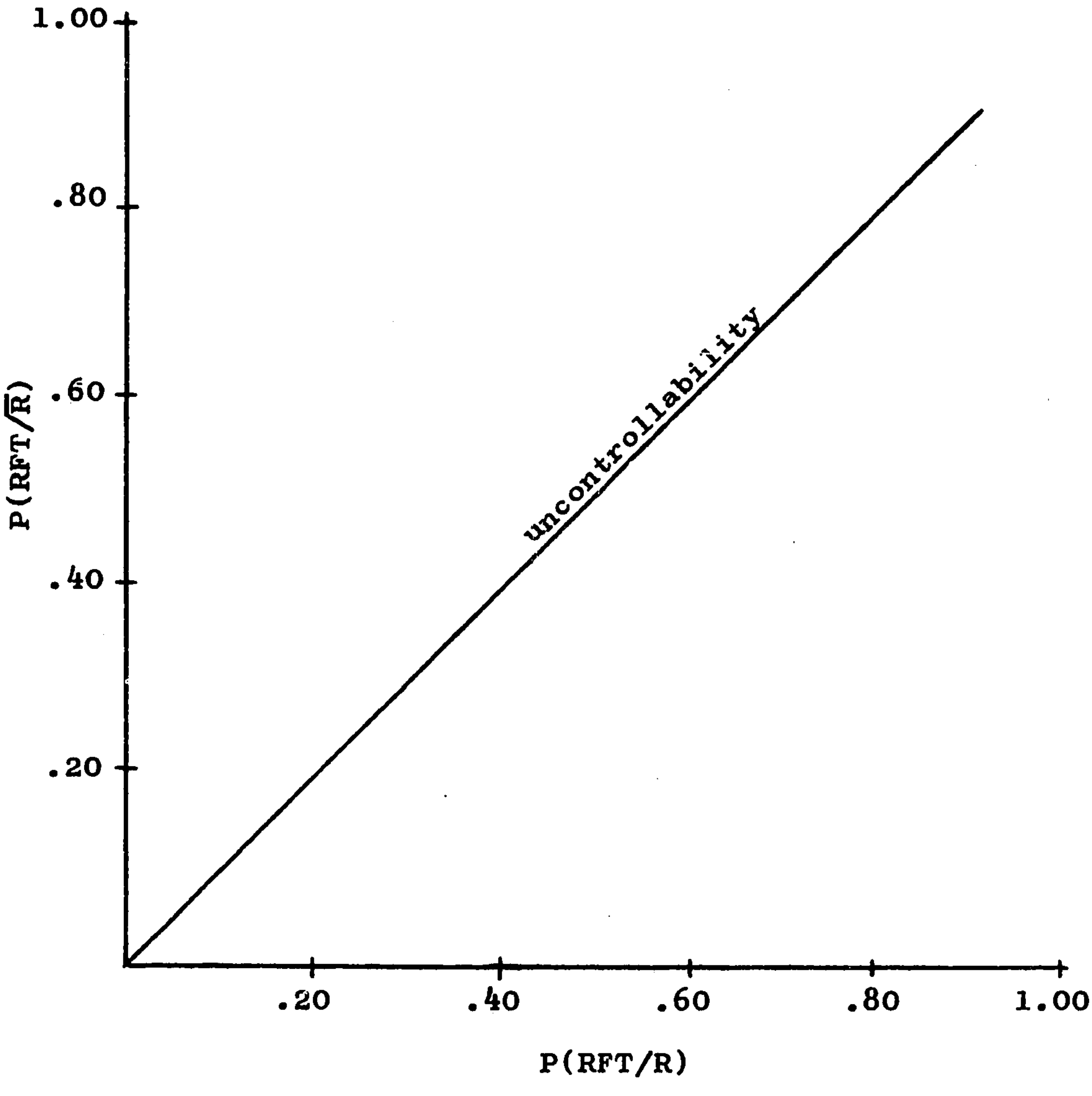

Fig. 4.* Conditional probability of reinforcement describing uncontrollability and conjoint variations.

*(Adapted from Seligman, Maier, & Solomon, 1969).

if _S_ can control an event by his responses, it may be able to use the response feedback to predict that event. However, even if _S_ can predict an event, it does not necessarily have the power to control it. Thus, if a CS predicts shock, _S_ may or may not be able to modify the US.

The present investigation involves utilization of uncontrollable, inescapable, and unavoidable stress, therefore, a review of both the animal and human literature in this area is relevant.

Animal literature.--With uncontrollable stress, no response _S_ can make will affect the occurrence of the stressor. Seligman _et al_. (1969) note that an experiment in which _S_ receives inescapable and unavoidable shock can best be described by a point along the independence line of the instrumental training space.

The primary concern of the present study with uncontrollable stress involves the outcomes of a situation where _S_ is first given acquisition under inescapable and unavoidable shock, followed by test trials where escape/ avoidance (control) is possible. Seligman _et al_. (1969) note that experiments of this type differ widely, i.e., the nature of the inescapable shocks differ, the situations in which the shocks are given differ, and the species differ, and despite the variety a consistent picture emerges.

Seligman *et al*. (1969) discuss four different test situations for uncontrollable stress, e.g., (1) two-way shuttle box escape/ avoidance, (2) escape/ avoidance by manipulation (bar press, wheel turn, etc.), (3) one-way shuttle box escape/ avoidance, and (4) passive avoidance.

A short discussion follows on the first two test situations only and the author refers the reader to Seligman, Maier, and Solomon (1969) for extensions of these two and inclusion of the third and fourth test situation.

In a two-way shuttle box the unique feature is that there is no environmental cue to safety (e.g., as in a one-way shuttle box apparatus) but a shuttling over the hurdle leads *S* to safety.

Overmier and Seligman (1967) and Seligman and Maier (1967) investigating uncontrollable electric shocks were perhaps among the first to notice the dramatic effects produced by subsequent inescapable shocks on two-way shuttlebox escape/ avoidance. One group of dogs was not given the control over shock in a two-way shuttlebox. A CS (light) onset for 10 sec., then overlapped 60 sec. of high intensity shock. However, if *S* remained past 10 sec. he received constant shock for 60 seconds during which time he was to learn an escape response.

Results revealed that the group who received subsequent inescapable shock was severely retarded in dealing with later escapable shock, e.g., 7 of 8 Ss failed to make a response on 9 out of 10 trials. Seligman labelled this retardation of escape or avoidance the "interference effect."

A most interesting aspect of this "effect" is that it does not depend upon particular shock parameters as did much of Brady's (1958) work. Overmier and Seligman (1967) and Seligman and Maier (1967) found the "effect" with a variety of frequencies, densities, durations and temporal distributions of inescapable shock. Maier, Seligman, and Solomon (1968) further note a most interesting aspect of the phenomenon, i.e., it occurs whether or not the uncontrollable shocks are preceded by a signal. Similar results are found by Carlson and Black (1960), Leaf (1964), Overmier and Leaf (1965), and Overmier (1968).

The "effect" has also been shown to generalize across species. Mullin and Mogenson (1963) gave different groups of rats varying amounts of fear conditioning in a two-way shuttlebox. Twenty-four hours later the groups received escape/ avoidance training with the previous fear conditioning CS as the signal. Results revealed that the groups given fear conditioning were significantly slower at escaping shocks than were the control, but only on the first few trials. An interesting fact was that the more fear conditioning the rats had, the more slowly they escaped. However, once the escape response was learned the preshocked group learned to avoid more rapidly than did the controls. Weiss, Krieckhaus, and Conte (1968) found a decrement in both escape and avoidance in rats as a result of prior fear conditioning. Similar results with rats are reported by Anderson, Cole, McVaugh, and Taylor (1968) and Anderson, Schwediman, Peckham, and Taylor (1967).

Braud, Wepman, and Russo (1969), using a rat population, tested the species generality of the "interference effect." These authors gave three groups six days of acquisition training in which one group was allowed to escape, a second group received uncontrollable yoked shock, and a third received no shock. All _S_s were then given, after 24 hours of rest, five water escape trials in which swimming time was measured. The escapable shock _S_s learned the water escape task faster than the no shock control _S_s, while the inescapable shock _S_s swam increasingly slower over trials. Similar results are obtained with goldfish (Behrend and Bitterman, 1963; Pickney, 1967).

Seligman _et al_. (1969) have noted that the "effect" is quite large in dogs, i.e., they sit and take shocks, while rats and goldfish are merely slower at getting out of shock, i.e., species other than dogs thus far tested do respond but with a slower latency. Seligman _et al_. (1969) note that prior uncontrollable shock retards the learning of manipulandum escape/ avoidance just as it retards two-way shuttling.

Dinsmoor and Campbell (1965a) subjected rats to uncontrollable shock in a lever press box while control Ss were merely placed in the box without shock. All rats then received trials of escapable shock (by lever press). Rats with previous uncontrollable shock training were slower to make their first escape and slower to acquire a stable escape response than were the nonshocked rats. Further support for this finding with varied temporal and shock parameters is evidenced by Dinsmoor and Campbell (1965b) and Dinsmoor (1958). Finally, Seward and Humphreys (1967) found that cats with subsequent uncontrollable shock were slower to acquire a wheel pawing response in order to escape and avoid shock than were either naive cats or cats exposed to subsequent escapable shock.

The above data lend credence to the validity of the "interference effect" but offer little in the way of theoretical explanation. Seligman et al. (1969) note that many hypotheses have been proposed to explain only a subset of the data mentioned above. Since the desire is for an all inclusive explanation, each of these hypotheses are briefly mentioned below, evaluating their adequacy as a theory.

Adaptation.--The adaptation theory hypothesizes that Ss adapt to shock during subsequent exposure to shocks and therefore are not "motivated" enough to learn to escape or avoid in later test situations. Seligman _et al_. (1969) note that the hypothesis has been offered (e.g., McDonald, 1946) as an explanation of instances in which interference results. This theory is inadequate since it is unable to account for the effects of repeated, intense electric shocks (Church, LoLordo, Overmier, Solomon, & Turner, 1966). A second notable inadequacy involves the fact that if adaptation occurs, it is unlikely to persist for the time periods that intervene between preshock and the escape/ avoidance test. Overmier and Seligman (1967) and Seligman and Maier (1967) observed that their preshock dogs did not look adapted during initial shocks of test trials (e.g., howling, defecating and urinating) or on later trials (e.g., still whimpered and jerked). Thus Overmier and Seligman (1967) claimed to have disconfirmed the adaptation explanation with experimental findings, i.e., very intense shocks (6.5 ma) in the shuttle box did not reduce the interfering effects of prior inescapable shocks. The underlying hypothesis was that if _S_ failed to respond or responded slowly because shock is not motivating enough, the increased intensity of shock should produce responding. Seligman and Maier (1967) reported that a series of escapable shocks received in a harness did not lead to interference with shuttling to avoid the shocks; however, the same shocks, if inescapable, produced, interference. Seligman _et al_. (1969) point out that both escapable and inescapable shocks should lead to the same amount of adaptation; however, their effects are strikingly different. Seligman _et al_. (1969) further point out that there is no rationale as to why the effects of inescapable shocks in a two-way shuttle box could be eliminated if the dog were dragged back and forth over the barrier in escape/ avoidance trials. There is, therefore, no rationale as to why this kind of "therapy" should make the dog less adapted to shock.

Sensitization.--Seligman _et al_. (1969) state that this hypothesis holds that preshock sensitizes _S_ to later shocks and thus in active avoidance training _S_ is "too motivated" to make organized responses in the test situation. If prior inescapable shocks make _S_ over motivated then reducing the stressor intensity should allow _S_ to respond. However, Overmier and Seligman (unpublished data) found that the "interference effect" was not eliminated when shock intensity was greatly reduced.

Competing Motor Responses.--Maier _et al_. (1968) note that there are four primary forms of competing motor responses.

The first form is based on the notion of superstitious reinforcement. Briefly, it states that some specific motor response happens to occur in close temporal contiguity with shock termination during inescapable shocks and this accidental pairing makes for greater probability of response reoccurrences. A continuation of this process, according to the theory, establishes some strong motor responses to shock. Therefore, if this response is incompatable with the new response (escape/ avoidance), and if it is elicited by shock in that situation, then S should show interference with escape/ avoidance learning. However, if the new response is not incompatible with the old, then facilitation not interference should result. Seligman et al. (1969) note this explanation as inadequate since none of their dogs were ever observed to manifest superstitious behavior. As Seligman et al. (1969) note, more importantly, the theory contains flaws. If the accidentally acquired response is not specified in advance there is no way of predicting whether prior inescapable shocks will cause interference, facilitation or no effect.

The second version is based on superstitious punishment which involves punished active responses during exposure to inescapable shocks with the probability of such responses decreasing. Seligman et al. (1969) note that this version has the same problems as does superstitious reinforcement.

The third version states that S reduces the "severity" of inescapable shocks by making some specific motor response (Weiss, 1968). Overmier and Seligman (1967) and Seligman and Maier (1967) delivered inescapable shocks through foot electrodes coated with paste. They note that it is therefore unlikely that _S_ could have modified the contact or resistance by any motor responses. To test this Overmier and Seligman (1967) administered shocks to dogs completely paralyzed with curare. In later test trials, free from the influence of curare, these dogs failed to escape in a two-way shuttle box; whereas, control _S_s given curare and no shock on subsequent trials learned the avoidance task in the test trials. This theory is also inadequate.

Finally, Weiss, Kriekhaus and Conte (1967) maintain that uncontrollable shocks affect later avoidance behavior through classical conditioning of a strong fear to the CS, rather than through instrumental reinforcement or punishment, i.e., strong fear directly produces freezing and _S_ later freezes in the response to the CS in escape/ avoidance training, thus interfering with the required escape response. However, Seligman _et al._ (1969) have pointed out that prior uncontrollable shocks retard subsequent escape/ avoidance learning even if the preshock and training situations are quite different. Weiss offered strong support for the hypothesis in a test where rats were first given fear conditioning with a tone CS and shock US followed by two-way shuttling with the same CS. The usual interference phenomenon was found. The theory appears sound, however, several problems concerning it will be discussed later.

Emotional Exhaustion.--The question under this topic is whether dogs fail to escape because they are emotionally exhausted. This would appear to be plausible reasoning because the interference effect has a time course. In all of the experiments discussed thus far, 24 hours intervened between uncontrollable stress and escape test trials. Overmier and Seligman (1967) reported no interference effect when escape training came either 48, 72, or 144 hours after inescapable shock. Seligman et al. (1969) suggest that perhaps uncontrollable stress produces parasympathetic overreaction (Brush, Myer and Palmer, 1963; Brush and Levine, 1965).

Seligman et al. (1969) hold that the hypothesis that preshock causes interference by producing emotional exhaustion is inadequate since the effect is found to persist if inescapable shocks are repeated, i.e., if a dog fails to escape in the shuttle box after 24 hours, it will fail to escape a month later (Seligman, Maier, and Geer, 1967).

The dogs are not apparently exhausted since they do occasionally jump the barrier in the intertrial interval or at the end of the session. Further, Seligman and Maier (1967) reported that a series of escapable shocks does not produce the interference, which means that an emotional state of exhaustion does not rise from shock per se. Maier et al. (1968) note that if a naive dog first receives escape training in the shuttle box, followed by inescapable shock, it will later escape normally. Finally, Seligman et al. (1967) reported that the "effect" is "curable" therefore, if the dog were emotionally exhausted, merely showing him the correct response should do no good (i.e., not reduce exhaustion).

Learned Helplessness.--Seligman and Maier (1967) and Maier et al. (1968) proposed a different view to account for the interference effect. Central to this view is that, during uncontrollable stress, what S does and what it receives are independent. For example, consider a dog given inescapable shocks who at first sturggles and howls but to no avail since none of these responses affect either the onset, termination or duration of the shocks, i.e., the shocks are independent of all voluntary responding. Seligman et al. (1969) state that we can assume Ss learn some acts produce reinforcement and that some acts no longer produce reinforcement. But when stress is uncontrollable the relation between act and outcome is none of these, but one of independence.

The essence of Seligman's hypothesis (i.e., learned helplessness) is that Ss can learn that their responses are independent of reinforcers. For S to learn responding and reinforcement are independent, S would have to be sensitive to the conditional probability of reinforcement given a specific response, absence of a specific response, and the conjoint variations of these probabilities.

Independence between responding and shocks can be considered as a special case in which the two conditional probabilities are equal. Seligman *et al*. (1969) discuss in four points how the relation of independence between responses and shocks produces the interference phenomenon. First, *S* makes active responses to inescapable stress. Second, since the stressor cannot be controlled, *S* learns that shock termination is independent of its responses. Third, *S*'s incentive for initiating active responses during shock is assumed to be produced in part by its expectation that the probability of shock termination will be increased by these responses. If this expectation is absent, there is little incentive for responses. Fourth, the presence of shock in the escape/ avoidance training situation should then arouse the same expectation previously acquired during inescapable shocks. Therefore, the incentive for responding in test trials is low. Maier *et al*. (1968) have proposed the term "learned helplessness" as a label for these hypothetical expectational and incentive mechanisms.

Seligman *et al*. (1969) further point out learning that shock termination and responding are independent should interfere with the subsequent association of responding and shock termination, just as learning of an A-B list interferes with the learning of an A-C list in verbal learning.

Maier _et al_. (1968) point out that it is not shock per se that produces helplessness, but rather it is _S_s lack of control over the shock.

Seligman _et al_. (1969) and Maier _et al_. (1968) suggest three tests of the learned helplessness hypothesis.

1. Escapable versus inescapable preshock. Seligman and Maier (1967) tested this hypothesis with three groups of dogs. An escape group was trained in a harness to panel press with its nose or head in order to turn off shock, while a yoked group received shocks yoked to the escapable group and was thus inescapable. A control group received no shock. Results revealed that the escape group learned the correct instrumental response with decreasing latencies, while the yoked group lay motionless. In test trials, 24 hours later, in a shuttle box, the escape group continued quick latency avoiding as did the control, however, the yoked group showed, in most cases, no responses at all. Those who did, showed increasing escape latencies. Thus the learned helplessness hypothesis was supported, i.e., it is not just the shock in and of itself which produces the phenomenon, but _S_s lack of control over the situation.

The "fear-freezing" hypothesis (Weiss _et al_., 1968, referred to above) is not supportive of this finding, e.g., escapable shocks of equivalent duration and intensity should produce the same amount of conditioned fear and thus the same amount of freezing, a fact which reduces the validity of the "fear-freezing" hypothesis.

2. The immunization procedure. Seligman *et al.* (1969) state that the helplessness hypothesis suggests that prior experience with controllable shocks should interfere with *S*s learning that shock is uncontrollable and should allow *S* to establish a discrimination between the places where shocks are controllable and uncontrollable. Thus the hypothesis predicts that one should be able to "immunize" *S*s against the interfering effects of uncontrollable shocks. The Seligman and Maier (1967) study gives evidence for such a hypothesis. They gave dogs 10 trials of escape/ avoidance training with control over shock. Later trials followed which involved unavoidable stress. In the test phase these dogs did not differ from the group who had never had inescapable shock. Thus immunization must be a result of controllability of initial shocks. In addition, when an escape or avoidance response is well learned, subsequent exposure to uncontrollable shocks can actually enhance escape performance.

Seligman *et al.* (1969) cite Sidman, Herrnstein, and Conrad (1957) who trained monkeys to perform an avoidance response on a Sidman schedule. When performance was nearly perfect, Ss were exposed to occasional, unpredictable and uncontrollable shocks while they were performing the avoidance response. The response rate was reported to increase. Kelleher, Riddle, and Cook (1963) obtained similar results with dogs and Braum (1955) with rats.

3. A therapy procedure. A most practical and perhaps beneficial aspect of the helplessness hypothesis is that it suggests a way to break up interference once it has occurred. If the dog failed to escape because it has learned the independence of response and reinforcement, forcibly exposing it to the escape/ avoidance contingency should weaken this expectation and eliminate the interference. Seligman et al. (1967) in such a test pulled dogs, which had repeatedly failed to escape during CS and shock, from one side of the shuttle box (with barrier absent) to the other side, thus making S avoid shock. After 50 forcible trials each dog finally began to respond on his own. Seligman et al. (1967) noted, however, that other less forceful therapeutic procedures had failed, e.g., removing the barrier and (a) calling to the dog, (b) dropping food in the other side, and (c) kicking the side of the box. Their ineffectiveness was explained in that they were not effective in exposing S to the escape/ avoidance contingency.

The learned helplessness hypothesis appears to be well supported in all of its predictions and thus offers to the present study a format for theoretical and empirical test.

Human literature.--All of the above evidence has been compiled on animal Ss. Although many studies have utilized human Ss with escapable and inescapable shock, none have made an explicit attempt with humans to test the learned helplessness hypothesis. The present investigation offers such an empirical test.

A pilot study was conducted prior tc the planning of the present study. The pilot included three groups. Group I received subsequent training of escapable shock, Group II received subsequent inescapable shock, and Group III received no shock. Although the test phase involved a 12 minute intelligence test and proved to be a poor choice (at this stage of research) for the test trials, the procedure and the results did suggest several problem areas one must solve before an adequate test of the hypothesis was conceivable. The results of the pilot investigation were nonsupportive of the learned helplessness hypothesis. One of the first questions as to why the results were negative involved the shock intensity. Seligman and Maier (1967) stated that it is not the shock intensity per se which causes the learned helplessness phenomenon, but a learning of independence of reinforcement and response. Even so, all of Seligman's empirical tests involve shock at traumatic or near traumatic levels, i.e., 4.5 ma. How stressful must the shock in training trials be for the phenomenon of helplessness to develop?

Thornton and Jacobs (1970) and Thornton, Levy and Jacobs (1969) through the utilization of a perceived stress index (PSI) (Jacobs and Munz, 1968) and post session interviews, noticed that Ss neither reported being stressed nor appeared stressed after about three trials of the training phase. The PSI data (Thornton et al., 1970) revealed a high stressed state prior to the first trial of choice reaction time responding; however, all stress (according to the PSI) had dissipated by trial 15 and remained dissipated through trial 30. From the pilot study mentioned above, a hypothesis was formulated stating that even though the helplessness hypothesis depends upon learning of independence and not stressor intensity per se, there must be at least a minimum level of stress and that this stress should be perceptually constant throughout training trials. In order to test such a hypothesis a review of the previous research utilizing shock with humans is necessary.

A review of the literature of stress contributes only to the dismay and confusion of the reader. Contradiction in the literature is easily detected. For example, if one is interested in examining the effects of stress on simple manipulandum tasks, he can find about as much evidence supportive of a facilitation of performance under stress (Guthrie, Loree, and Traweek, 1966; Johanson, 1922) as he can a decrement of performance under stress (Craig, 1966; Freedman, 1966; Nash, Phelan, Deman, and Bittener, 1966).

The present paper proposes the hypothesis that, due to a host of different stressor instructions and intensities administered, the contradictory reports are a result of a confounding of instructions and/or US intensities and not a failure from simple drive theory predictions.

A review of the literature exposes one to the variety of stress conditions. Two subareas follow which relate two kinds of stress instructions.

1. Traditional instructions: the traditional instructions used for some time inform S that he will be allowed to adjust his shock level to an "unpleasant" but not "painful" level.

Results using these instructions have been contradictory, e.g., Saltz and Riach (1961) in a stimulus differentiation task and Nash et al. (1966) in a simple reaction time task found stress retarded performance, while Jacobs and Kirk (1969), Thornton and Jacobs (1970) reported performance increments under stress. Further, Freeburne and Schnider (1968) reported that shocked Ss learned a temporal maze faster than non-shock Ss.

Rosen and Czech (1966) reported that S's decision time under approach-avoidance conflict involving electric shock was inversely related to the voltage intensity.

Prior to administering the first shock Thornton, Levy, and Jacobs (1969) noted that Ss reported, by the PSI, to be in a stressed state; however, the subjective setting of the shock level was reported to have reduced the stressed state to practically 0 (i.e., in a non-stressed state). Why? It is hypothesized that the traditional instructions (a) allow S to define the situation for himself (i.e., shock will never be any worse than the highest level he has set), and (b) tend to allow S to set a superficially "unpleasant" intensity level. It was noticed in the Thornton and Jacobs (1970) study, through post session interviews, that Ss often, upon experiencing the first or second shock, jumped the gun, so to speak, and reported the intensity as unpleasant. After the experiment, 13 of the 24 Ss reported that they felt they had set the level far below what was truly unpleasant. Several Ss reported that the level they set was actually so low that they could perform the task with no concern of the shock.

The key problem with the traditional instructions would appear to be that Ss, after setting the subjective shock level, gain predictability concerning the shock intensity, even though they are unable to predict its occurrence (e.g., uncontrollable shock).

Indirectly related, Seligman et al. (1969) noted that anytime animals or humans are given a choice between any amount of predictability and unpredictability of shock they will choose predictability. Choice for predictable shocks are reported by Lockard (1963) and Pervin (1963). In addition, D'Amato and Gumenik (1960), Cook and Barnes (1964) and Badia, McBane, Suter, and Lewis (1966) have all demonstrated that human Ss prefer immediate over delayed shocks. One answer is that predictable shocks may cause less stress than unpredictable shocks. Behavioral, physiological, and subjective measures of stress suggest that this may be so. Several animal studies have supported this hypothesis (Azrin, 1956; Brimer and Kamin, 1963; and Sawrey, 1961).

The evidence conflicts, however, on whether the unpredictable shocks hurt more or whether the whole unpredictable shock situation is more anxiety arousing. D'Amato and Gumenik (1960), Pervin (1963), and Badia et al. (1966) all reported that Ss say they dislike unpredictable shocks more than they dislike predictable shocks. It should be reiterated at this point that unpredictability generally has reference to a host of relationships between shock and its occurrence. That is, S may gain predictability by knowing the contingent condition of the shock delivered, by knowing whether shock is immediate or delayed, by knowing the shock intensity, etc. This author holds that the predictability of shock intensity may be a very important variable in the perceived stress which S manifests.

2. Non-traditional instructions. The following studies, utilizing a variety of techniques for setting the intensity of shock, tend to fall into two areas (a) those setting a constant shock level, and (b) those setting a subjective level of shock and then incrementing it arbitrarily.

(a) Constant level shock. Ryan (1961) investigating motor performance (stabilometer) under stress which was set at a constant 4.4 ma 350 V and Craig (1968) using 3. ma, found no support for the hypothesis that mild punishment would facilitate performance as compared to a no shock control. Desiderato (1964) and Martin and Bwan (1963) using 1. and .5 ma constant shock found that increases in stimulus intensity significantly increased response speed.

(b) Subjective level plus. D'Amato and Gumenik (1960) in a cognitive guessing task set shock according to the traditional instructions (discussed above) and then every fifth trial, raised the shock level "arbitrarily" to a maximum of 5. ma, reached in 25% of the cases. Carron and Morford (1968) set shock in a similar manner.

Studies utilizing this technique of shock administration pose two problems. First, they assume that all Ss will respond to setting the shock level alike. Thornton and Jacobs (1970) noted that in a few instances Ss would go to 6. ma, a maximum given, and still not report it as unpleasant. When questioned concerning the shock level S stated that he understood the instructions but wanted to see how much he could take. In other instances, Ss were noted to set their shock level at .5 ma, much below unpleasant. The perception of increase for these two Ss would be considerably different.

Secondly, these authors do not state the level of increase, but say that it is arbitrary. Increasing from 1. ma to 1.5 ma or from 2.5 ma to 3. ma is certainly unlike (physiologically and perceptually) an increase from 1. ma to 2. ma or 2.5 ma to 3.5 ma. The point is, a small increment barely detectable over trials may be much easier to adapt to (possibly even undetectable) than would be a larger increase. Furthermore, with a larger increase, S could acquire a quite strong fear (expectation of greater and greater shock) which could disrupt the response.

Thus all shock instructions used in current research appear to have their concomitant problems which quite clearly may lead to a confounding effect of the data. It is possible that this confounding may be one of the key factors responsible for many of the contradicting reports using humans as subjects.

If a technique could be developed for eliminating the biasness of subjective report and the confounding effects of constant shock, then the possibility for a test of the helplessness hypothesis would appear at least promising.

3. New instructions. The present experiment introduces a new technique for instructional stress set which includes a stressor combination: threat of shock combined with actual shock delivery. The instructions inform S that he will be delivered (no pretraining experience with shock) shock according to an electronic programming unit. The unit will be described as operating on a random basis, therefore, neither S nor the experimenter will know at any one trial, if shock is delivered, what the level will be. The intensity of electric shock will be described to vary over a continuum, in this random manner, from low to high intensity (Shock intensity will be randomly delivered at the following levels: .8, 1.3, 1.6, 2.0, 2.5 ma, 600V).

These new instructions are being developed in order to achieve three primary purposes: (1) to reduce the possibility that S will define the stress level from the outset (i.e., choose a low level), and thus early in trials, dissipate the stressed state, (2) to remove the element of expectation S might gain from a constant shock level, and the subsequent facilitated adaptation, and (3) to reduce the predictability S might have over shock intensity, a situation Seligman et al. (1969) and others noted as increasing the stressed state.

The problems of confounded effects and / or subjective variability are felt to be eliminated in such instructions, since each S, in his responding, will not be able to form any expectations that his last shock level will be his highest. It is thus hypothesized that Ss stressed state will remain at a rather elevated constant level across trials.

Statement of the problem.--The problem of the present paper is an attempt to test the learned helplessness hypothesis in humans and to develop a new technique for creating a stressed state. It is felt that once the phenomenon is established in humans, more extensive investigation can follow, possibly leading to new techniques for treating the mentally disturbed. For example, Seligman (1969) theorizes inoculating schizophrenics against their learned helplessness histories by training them in control over the factors which influence them.

The present investigation will utilize 8 groups who will be given 30 choice reaction time training trails and then transferred to 10 test trials in a new task. The first four groups will be administered the traditional instructions and consists of one group who, in training trials, will receive escapable shock (E_1), a second group who will perform the task but receive inescapable yoked shock (Y_{11}), a third group who will receive yoked inescapable shock and no task (Y_{21}), and a fourth group who will perform the task with no shock (C_1). The other four groups will consist of the same contingency groups but now given different shock instructions and carrying a subscript of $_2$ (e.g., E_2, Y_{12}, Y_{22}, & C_2).

A PSI will be administered before trial 1, after trial 15, and after trial 30 to analyze for differences in perceived stress states in each instructional set.

The hypotheses specifically tested will be:

1) that the two shock instruction groups will differ.

2) in acquisition (training) trials the following predictions are made in reference to reaction time scores;

(a) $E_1 = Y_{11} = C_1$

(b) $E_2 < Y_{12} = C_2$

(c) $E_2 < E_1$, $Y_{12} > Y_{11}$, $C_1 = C_2$

3) in test trials the following predictions are made;

(a) $E_1 = Y_{11} = Y_{21} = C_1$

(b) $E_2 < Y_{12} = Y_{22} = C_2$

(c) $E_2 < E_1$, $Y_{12} > Y_{11}$, $Y_{22} > Y_{21}$, $C_1 = C_2$

4) predictions from the PSI are as follows;

(a) traditional instructions > new instructions (greater in this instance meaning greater PSI score value, i.e., more pleasant).

(b) in traditional instructions $PSI_1 < PSI_2 = PSI_3$

(c) in new instructions $PSI_1 = PSI_2 = PSI_3$

Method

Subjects.--Ss will be 80 introductory psychology volunteers at the University of Oklahoma who will receive point bonus incentives for participation. Ss will be randomly divided into one of two instructional set groups and then blocked on PSI base scores (administered in the classroom before the study is described or volunteers taken) over the four shock contingency groups.

Apparatus.--The apparatus will consist of two separate and distinctively different units; each of which will be used for a different phase of the experiment.

The training apparatus will consist of three distinctly separate rooms each of which will contain identical choice reaction time units. Each unit will consist of a display board on which will be located, at the top, a yellow warning light followed by three horizontal green stimulus lights. Ss manipulandum will be a panel containing three buttons each of which correctly corresponds to the stimulus lights. In front of the stimulus buttons will be located a red button, referred to as a ready signal button, which will serve the purpose of insuring S's hand will be in a consistent place preceding a trial. In two of the three rooms and in a fourth ½ in. silver electrodes will be used. The fourth room will consist of an empty room containing only a chair and electrodes (no apparatus).

The test apparatus will consist of four distinctly separate rooms each of which will contain identical tasks. The test task will consist of an 8 in. square box on which will be located a light surrounded by seven white buttons. Depression of the first and fifth buttons in any fashion will break all circuits i.e., shock, light, & clock. In each of the four rooms will also be located ½ in. silver electrodes.

Shock delivered through the electrodes will be generated by a Grayson-Stadler 350 V constant current shock apparatus. Shock will be delivered in training trials at a 1. sec. duration with no partial shock available. In test trials shock will be for 3. sec. constant, with partial shock possible (depending upon <u>S</u>s response latency). Reaction time will be recorded by three standard timers (1/00th of a sec.). A series of latching and timed delayed relays are expected to reduce substantially experimenter variability in the results.

<u>Design</u>.--The experimental design for the learned helplessness test will consist of a 2 X 4 factorial analysis with the first factor representing instructions, varied at two levels, (1) traditional shock instructions and (2) new shock instructions, and the second factor representing

subsequent shock contingency varied at four levels, (1) experimental group (E) (subsequent escapable shock), (2) yoked 1 group (Y_1) (subsequent inescapable shock with task), (3) yoked 2 (Y_2) (subsequent inescapable shock, no task), and (4) control (C) (subsequent no shock).

Procedure.--Upon entering the laboratory, Ss will be assigned to their respective rooms as described by the PSI blocking variable (i.e., Ss will be blocked on PSI scores over the four groups). The experimenter will attach electrodes on the underneath side of the arm, three inches below the elbow, then play a tape recording of three sets of instructions. First, the general instructions to the task will inform E_1 that his task is to depress the button correctly corresponding to the stimulus light which comes on. Second, taped instructions will inform E to the contingency between shock and slow or incorrect responding, and finally E will receive instructions (either traditional or new instructions, depending on which group is being run) concerning the shock. If traditional shock instructions are used, a subjective shock level will be set. The experimenter will then follow the same procedure with Y_1, except in the place where E subjects listen to escapable shock instructions, Y_1 Ss will hear inescapable shock instructions informing S that he will be receiving several shocks during some of the upcoming trials, which will be unrelated to his task which is to depress the correct button quickly when the stimulus light comes on. Y_2 Ss will listen to inescapable shock instructions informing S that he will be receiving several inescapable electric shocks, and is asked to remain seated while being administered the shocks. Group C Ss will hear only the general instructions.

After completing all instructions the experimenter will then administer an "at this moment" PSI scale. Upon completion of the scale all groups, except Y_2 Ss, will perform 15 reaction time trials. Ss will receive a random schedule of stimulus light occurrences in the reaction time task and a random schedule of intertrial intervals. To avoid expectation performance, a variable interval between warning and stimulus light of 3 and 6 seconds will be used. After 15 trials, a second "at this moment" PSI scale will be administered, followed by 15 more trials and a third "at this moment" PSI.

Following the completion of the PSI scales each S will be moved individually into a second room containing the test equipment. After attaching the electrodes, S will listen to taped instructions informing him that he will be receiving shocks during the next few minutes according to the shock instructions (traditional or new). S will then be informed that he can be told nothing about the task before him. All Ss will be given these same instructions, and group C Ss, in addition, will receive shock instructions. Following the completion of the instructions to all groups for test trials, 10 trials will be run. A trial will consist of 2 seconds of CS (light) alone, overlapping 3 seconds of US (constant shock). Latency responses will be recorded for each of the four groups. Any response over 5. seconds will be recorded as 5. seconds. A response latency 2 seconds will avoid shock for any of the four groups. Any response latency $>$ 2 seconds but $<$ 5 seconds will receive shock for that partial duration.

After the 10 trials are completed Ss will be asked two post session interview questions: (1) how did they perform the task (i.e., did they respond and if so how?), and (2) if they did not respond, why not? Ss will then be dismissed.

REFERENCES

Anderson, D.C., Cole, J., & McVaugh, W. Variations in unsignalled, inescapable preshock as determinants of responses to punishment. Journal of Comparative and Physiological Psychology, 1968, 65, 342-346.

Anderson, D.C., Schwediman, G., Taylor, J., & Peckham, S. Does inescapable unsignated preshock always produce conditioned apathy. Read at Western Psychological Association, 1967.

Azrin, N.H. Some effects of two intermittent schedules of immediate and non-immediate punishment. Journal of Psychology, 1956, 42, 3.21.

Badia, P., McBane, B., Suter, S., & Lewis, P. Preference behavior in an immediate versus variably delayed shock situation with and without a warning signal. Journal of Experimental Psychology, 1966, 72, 874-852.

Badia, P., Suter, S., & Lewis, P. Preference for warned shock: information and/ or preparation. Psychological Reports, 1967, 20, 271-274.

Brady, J.V., Porter, R.W., Conrad, D.G., & Mason, J.W. Avoidance behavior and the development of gastroduodenal ulcers. Journal of the Experimental Analysis of Behavior, 1958, 1, 69-72.

Behrend, E.R., & Bitterman, M.W. Sidman avoidance in the fish. Journal of the Experimental Analysis of Behavior, 1963, 6, 47-52.

Braud, W., Wepman, B., & Russo, D. Task and species generality of the "helplessness" phenomenon. Psychonomic Science, 1969, 16, 154-155.

Brimer, C., & Kamin, L.J. Disinhibition, hibituation, sensitization and the conditioned emotional response. Journal of Comparative and Physiological Psychology, 1963, 56, 508-516.

Brush, F.R., & Levine, S. The relationship between avoidance learning and corticostrone levels. Paper presented at the meeting of the Western Psychological Association, Honolulu, April, 1965.

Brush, F.R., Myer, J.S., & Palmer, M.E. Effects of kind of prior training and inter-session interval upon subsequent avoidance learning. Journal of Comparative and Physiological Psychology, 1963, 56, 539-545.

Carlson, N.J., & Black, A.H. Traumatic avoidance learning: The effects of preventing escape responses. Canadian Journal of Psychology, 1960, 14, 21-28.

Carron, A.V. & Morford, W.P. Anxiety, Stress and Motor Learning. Perceptual and Motor Skills, 1968, 27, 507-511.

Cook, J., & Barnes, L.W. Choice of delay of inevitable shock. Journal of Abnormal and Social Psychology, 1964, 68, 669-672.

Church, R.M., LoLordo, V.M., Overmier, J.B., Solomon, R.L., & Turner, L.H. Cardiac responses to shock in curarized dogs: Effects of shock intensity and duration, warning signals and prior experience with shock. Journal of Comparative and Physiological Psychology, 1966, 62, 1-7.

Craig, E.A. Situational stress and safety. Personnel Journal, 1966, 45, 269-272.

D'Amato, M., & Gumenik, W. Some effects of immediate versus randomly delayed shock on an instrumental response and cognitive processes. Journal of Abnormal and Social Psychology, 1960, 60, 64-67.

Desiderado, O. Effect of anxiety and stress on reaction time and temporal generalization. Psychological Reports, 1964, 14, 51-58.

Dinsmoor, J.A. Pulse duration and food deprivation in escape from shock training. Psychological Reports, 1958, 4, 531-534.

Dinsmoor, J.A., & Campbell, S.L. Level of current and time between sessions as factors in "adaptation" to shock. Psychological Reports, 1956, 2, 43-49 (a).

Dinsmoor, J.A. & Campbell, S.L. Escape from shock training following exposure to inescapable shock. Psychological Reports, 1956, 2, 441-444 (b).

Freeburne, C., & Schneider, M. Shock for right and wrong responses during learning and extinction in human subjects. Journal of Experimental Psychology, 1955, 49, 181-186.

Freedman, P.E. Human maze learning as a function of stress and partial reinforcement. Psychological Reports, 1966, 18, 975-981.

Guthrie, F.A., Loree, M.R., & Traweek, M.W. Varying conditions of stress and performance on an academic type test. California Journal of Educational Research, 1966, 17, 41-47.

Jacobs, P.D., & Kirk, R.E. Effects of "task-related stress" on human performance on a two-component monitoring task. Perceptual and Motor Skills, 1969, 29, 815-823.

Jacobs, P.D., & Munz, D.C. An index for measuring perceived stress in a college population. The Journal of Psychology, 1968, 70, 9-15.

Johanson, A.M. The influence of incentive and punishment upon reaction time. Archives of Psychology, 8, no. 54, 1922.

Kelleher, R.T., Riddle, W.C., & Cook, L. Persistent behavior maintained by unavoidable shocks. Journal of the Experimental Analysis of Behavior, 1963, 6, 507-511.

Leaf, R.C. Avoidance response evocation as a function of prior discriminative fear conditioning under curare. Journal of Comparative and Physiological Psychology, 1964, 58, 446-450.

Lockard, J.S. Choice for a warning signal or no warning signal in an unavoidable shock situation. Journal of Comparative and Physiological Psychology, 1963, 56, 526-530.

MacDonald, A. Effect of adaptation to the unconditioned stimulus upon the formation of conditioned avoidance responses. Journal of Experimental Psychology, 1946, 36, 1-12.

Maier, S.F., Seligman, M.E.P., & Solomon, R.L. Pavlovian fear conditioning and learned helplessness. In Campbell, B.A., & Church, R.M. Punishment. New York: Appleton-Century-Crofts, 1968.

Martin, O.E., & Bwan, W. The influence of a premonitory cue and subsequent shock for errors upon human maze performance. Journal of General Psychology, 1963, 68, 81-88.

Mullin, A.D., & Mogenson, G.J. Effects of fear conditioning on avoidance learning. Psychological Reports, 1963, 707-710.

Nash, E., Phelan, J., Demas, G., & Bittner, A. Effects of manifest anxiety and induced anxiety and experimental variability on simple reaction time. Perceptual and Motor Skills, 1966, 22, 483-487.

Overmier, J.B. Instrumental and cardiac indices of Pavlovian fear conditioning as a function of US duration. Journal of Comparative and Physiological Psychology, 1966, 62, 15-20.

Overmier, J.B., & Leaf, R.C. Effects of discriminative Pavlovian fear conditioning upon previous or subsequently acquired avoidance responding. Journal of Comparative and Physiological Psychology, 1965, 60, 213-217.

Overmier, J.B., & Seligman, M.E.P. Effects of inescapable shock upon subsequent escape and avoidance responding. Journal of Comparative and Physiological Psychology, 1967, 63, 28-33.

Pervin, L.A. The need to predict and control under conditions of threat. Journal of Personality, 1963, 31, 570-585.

Pickney, G. Avoidance learning in fish as a function of prior fear conditioning. Psychological Reports, 1967, 20, 71-74.

Rosen, S. & Czech, D. The effects of discrepancy between subjective and physical intensity of electric shock on decision time. Journal of Experimental Psychology, 1965, 70, 198-204.

Ryan, E.D. Motor performance under stress as a function of the amount of practice. Perceptual and Motor Skills, 1961, 13, 103-106.

Saltz, E. & Riach, W. The effect of stress on stimulus differentiation. Journal of Experimental Psychology, 1961, 62, 588-593.

Seligman, M.E.P. Can we immunize the weak. Psychology Today, June, 1969, 42-44.

Seligman, M.E.P., & Maier, S.F. Failure to escape traumatic shock. Journal of Experimental Psychology, 1967, 74, 1-9.

Seligman, M.E.P., Maier, S.F., & Solomon, R.L. Unpredictable and uncontrollable aversive events. In Brush, F.R., Aversive Conditioning and Learning. Academic Press, 1969.

Seward, J.P., & Humphrey, G.L. Avoidance learning as a function of pretraining in the cat. Journal of Comparative and Physiological Psychology, 1967, 63, 388-391.

Sidman, M., Herrnstein, R.J., & Conrad, D.G. Maintenance of avoidance behavior by unavoidable shocks. Journal of Comparative and Physiological Psychology, 1957, 50, 553-557.

Thornton, J.W., & Jacobs, P.D. Analysis of task difficulty under varying conditions of induced stress. Perceptual and Motor Skills (in press).

Thornton, J.W., Levy, L., & Jacobs, P.D. Interference of learned helplessness in humans: A pilot study (unpublished data), 1969.

Waller, M.B., & Waller, P.F. The effects of unavoidable shocks on a multiple schedule having an avoidance component. Journal of the Experimental Analysis of Behavior, 1963, 6, 29-37.

Weiss, J.M. Effects of coping response on stress. Journal of Comparative and Physiological Psychology, 1968, 65, 251-260.

Weiss, J.M., & Conte, R. Effects of fear conditioning on subsequent avoidance and movement. Paper presented at the Eastern Psychological Association, New York, April, 1966.

APPENDIX II

INSTRUCTIONS

TRADITIONAL SHOCK INSTRUCTIONS

I am now going to set the level of electric shock you will receive through the electrodes I have just placed on your arm. When I leave the room I will deliver shock to you through the electrodes beginning at a low level. I will then increment the shock in very small amounts until you report that you feel that the shock is <u>unpleasant</u> but not <u>painful</u>. You are to indicate the level of shock that is <u>unpleasant</u> but not <u>painful</u> by depressing the red button in front of you and then releasing it.

Remember I will deliver shock in small increments and you are to depress the red button only when the shock becomes unpleasant but not painful. After you have released the red button you are to wait for the trials to begin.

Do you have any questions?

NEW SHOCK INSTRUCTIONS

The level of electric shock you will receive through the electrodes will be determined by an electric programming unit. The programmer operates on a random selection basis.

The intensity of electric shock you will receive will vary over a continuum, in this random manner, from low intensity to high intensity electric shocks.

Thus, in your performance of the task, if an electric shock is delivered on a particular trial, I will not be able to inform you as to its intensity.

If you feel at any time that the level of electric shock is too intense, press down on this red button and keep it down.

Do you have any questions?

APPENDIX III

TABLES

Table 4

Training Trial Means and Standard Deviations for the Shock Contingency Groups

	Traditional Instructions			New Instructions		
	E_1	Y_{11}	C_1	E_2	Y_{12}	C_2
$\overline{X}$	59.30	64.22	73.86	49.63	71.70	74.00
SD	18.97	11.06	16.39	7.36	13.41	17.70

Table 5

PSI Means and Standard Deviations
for the Shock Contingency Groups

		Traditional Instructions			
		E_1	Y_{11}	Y_{21}	C_1
PSI_B	M	10.12	9.91	9.98	10.28
	SD	2.06	2.14	1.67	2.16
PSI_1	M	7.79	9.33	9.78	9.62
	SD	1.33	2.40	1.81	2.09
PSI_2	M	9.57	9.88	9.37	10.34
	SD	2.06	1.48	2.20	1.87
PSI_3	M	10.38	9.11	10.16	10.34
	SD	1.61	2.23	2.00	1.87

		New Instructions			
		E_2	Y_{12}	Y_{22}	C_2
PSI_B	M	10.00	10.13	9.92	10.02
	SD	1.43	1.95	2.10	1.48
PSI_1	M	7.80	7.08	7.80	9.06
	SD	2.40	1.45	1.66	2.12
PSI_2	M	8.65	8.47	9.41	10.28
	SD	1.68	2.31	1.50	1.12
PSI_3	M	9.48	9.17	10.05	9.52
	SD	2.21	1.92	1.87	1.25