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Human Self-Punitive Behavior During Uncertainty of Delivery Time of Unavoidable Shocks

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HUMAN SELF-PUNITIVE BEHAVIOR DURING
UNCERTAINTY OF DELIVERY TIME
OF UNAVOIDABLE SHOCKS

BY

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MASTER'S THESIS SUBMITTED TO THE PSYCHOLOGY
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ABSTRACT

Twenty psychology graduate school subjects, ten males and ten females, established their own levels of aversity for two series of ten each unavoidable electric shocks, with each shock lasting 2.5 seconds and scheduled to be delivered automatically every 30 seconds. Condition #1 (high predictability) subjects could see a timer and know when 30 seconds had passed; Condition #2 (low predictability) subjects could not. All subjects could push a button and self-administer shocks at will. The data did not support the hypotheses that low-predictability subjects would self-administer more shocks and would take less total time for the series of shocks. Females self-administered fewer shocks and took longer time in the low predictability condition, and these data were correlated with their higher scores on measures of anxiety. Subjects preferred to set their own levels of electric shock and set them higher than previously reported in the literature; subjects reported that they could have tolerated many more than the twenty shocks. These results and paper and pencil responses of post-tests of anxiety were interpreted as contributing valuable information to the sparse literature on punishment with human subjects.

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HUMAN SELF-PUNITIVE BEHAVIOR DURING UNCERTAINTY
OF DELIVERY TIME OF UNAVOIDABLE SHOCKS

The literature dealing with the constructs of anxiety and fear is extensive. Anxiety, like fear and anger arises in response to danger. Cannon (1916) noted biological aspects of these emotions; i.e., increased respiration and blood pressure and number of red corpuscles set free by the spleen, to prepare the body for fight or flight. Anxiety was referred to as a state of arousal by Berlyne (1960). Some theorists have proposed that the term "anxiety" should be reserved for fear arising from an unknown source, and that the term "fear" should be assigned to awareness of a threatening specific object or source. Measured physiologically, the human body reacts in much the same way whether the anxiety is related to specific or diffuse objects (Levitt, 1967). Hilgard and Atkinson (1967) referred to anxiety as a state of apprehension related to fear. Ferster and Perrott (1968) mentioned anxiety as a state of the organism; they referred to changes in performance produced by an aversive stimulus. It is interesting that in more and more psychology textbooks, the "Subject Index" listing for anxiety is followed by "See Fear" (Boe and Church, 1968). Skinner (1938) referred to anxiety as a behavior pattern observed during the interval between a signal and an unavoidable aversive stimulus. Mowrer (1938) presented humans with a painful stimulus. Post-experimental subjective reports of the experience included the descriptions

"anticipation," "dread," "apprehension," "expectancy," "anxiety." For all practical purposes, anxiety and fear are indistinguishable (Levitt, 1967).

In experimental psychology, fear (anxiety) has often been treated as a learned response. Under classical conditioning, the presentation of UCS (shock) will elicit in the rat behaviors such as defecation, urination, freezing, whining, which are evidences of an emotion which can be called anxiety. With successive pairing of a CS (tone, light) with UCS, the subsequent presentation of CS alone will elicit similar respondents.

Anxiety may also be considered a learned (secondary) drive, or a reaction to a CS, based on the organism's innate tendency to avoid pain (Levitt, 1967). This is demonstrated typically with a two compartment box (Miller, 1948). When shock in compartment A, within a few trials the rat will escape through a door to non-shocked compartment B. In subsequent trials, when placed in compartment A, with no UCS, the rat still runs to B. Mowrer theorized that the stimuli accompanying placement in compartment A; i.e. the tone, grid, or color all served as CS's (anxiety) to evoke the motivating conditioned response of anxiety. The avoidance response of running is negatively reinforced by the reduction of the conditioned anxiety. This behavior is very resistant to extinction. This process is generally referred to as Mowrer's two-factor theory of avoidance, a combination of classical and operant conditioning, and is

thought to be analagous to the process underlying phobias in humans.

The punishment procedure has usually been defined as one in which a response is followed by an aversive stimulus in order to decrease its frequency of occurrence (Kanfer and Phillips, 1970). However, there are many studies with animals (e.g. Gwinn, 1949; Melvin, 1964; Brown, et al, 1964) to support the observation first made by Mowrer (1947) that punishment during extinction of avoidance behavior resulted in increased frequency of that response and increased resistance to extinction. If a small section of the grid floor at the far end of the alley near compartment B was permanently electrified so that the rat had to get a shock in running from start box A to safety compartment B, the running behavior apparently did not extinguish. Even though the rat never again experienced shock in A, flight from A to B continued (Candland, 1968). Two factor avoidance theory attempts to explain this phenomenon by suggesting that the punishment which is a consequence of his running arouses more anxiety, and his learned responses to anxiety increase. Mowrer (1947) related such paradoxical behavior to the "compulsive," "self-defeating," "masochistic" behavior which Horney (1937) and Mowrer and Ullman (1945) discussed under the concept of the "vicious circle." It is of interest that when punishment is administered under special conditions, the aversively motivated response of running could be either enhanced or

inhibited during extinction. Punishment applied near A resulted in faster running and greater resistance to extinction than punishment applied near B. (Campbell, Smith, Misanin, 1966).

When the organism is shocked in running from A during either avoidance training, escape training, avoidance-escape training, or punished extinction, punishment tends "to elicit the response of forward locomotion" (Brown, 1969; also Gwinn, 1949).

Many studies have investigated the significance of a stimulus signaling the occurrence of shock. In an avoidance situation, Sidman and Boren (1957) found that rats responded to terminate a warning signal as soon as possible even though that behavior was followed by delayed shock. This response was preferred to the alternative of postponing the delayed shock and prolonging the warning signal. While this is animal behavior and there were only four subjects, the results tended to support the observation that anticipation of pain may be more aversive than the pain itself.

The Sidman and Boren study is inconsistent with other studies emphasizing the predictability value of a warning signal in unavoidable shock conditions. Lockard (1963) shocked rats, which were free to roam, on both sides of a two compartment box. On the "predictable" side, each unavoidable shock was preceded by a warning signal; on the "unpredictable" side, there was no warning signal. Rats spent most of their time (90 per cent) on the "predictable"

side during acquisition, and only during extinction did they divide their time equally between the two compartments. In testing the specific hypothesis that signal-shock would be selected over shock-signal, Perkins, et al, (1963) ran 16 rats in a shuttle box for an eleven-hour session on each of six successive days, and gave them six shocks at irregular intervals every half hour regardless of what they did. On one side of the box, each 0.5 second shock was preceded by a signal light for three seconds; on the other side, a 0.5 second shock preceded a three second signal light. By the end of the day, subjects spent more than 75 per cent of their time on the signal-shock side; by the third day, almost 90 per cent of their time. Brimer and Kamin (1963) and Camp (1968) reported greater suppression of bar-pressing for food in rats receiving non-signalized shocks than receiving signalized shocks.

In testing the informational value of a warning signal, Badia, et al, (1966) found humans to have a preference for immediate 100 per cent shock with no warning signal. But these same subjects preferred a warning signal before a four second delayed shock administered 25 per cent of the time over immediate shock 25 per cent of the time. The latter difference was not statistically significant and the number of subjects was small. These findings were reversed in a study with a larger number of subjects (Badia, et al, 1967) and they concluded that most humans appear to prefer information (warning

signal) preceding an aversive event. Thus, receiving shocks without a warning signal is more aversive.

In an unavoidable shock situation rats preferred immediate over delayed shock. Knapp, et al, (1959) demonstrated this preference by placing hungry rats in a T-maze and allowing them to run for food. On one side, they received immediate shock in the chamber; on the other, shock was delayed 30 seconds. D'Amato and Gumenik (1960) showed that human males in an unavoidable shock situation, preferred a lever that produced immediate shock to a lever that led to randomly delayed shock of equal intensity which they later "judged as more unpleasant." Cook and Barnes (1964), in testing a redaction of Hull's reinforcement theory (Corollary 111),¹ found that humans "tended to " choose immediate rather than delayed shock when faced with time-delay options of 0, 2, 4, 6, 8 seconds, following a CS (light). The intensity and duration of shock was not known; there were only six trials,--five with shock; the delays were fixed, not variable, subjects were all males; and there was no statistical treatment of data. This tendency followed a shallow U-shaped curve over trials for 0-delay about which one might speculate as follows: at first, anxiety arose because of uncertainty about shock experience and this anxiety motivated the subject to take immediate shock. The

¹"Corollary 111. With training, organisms tend to choose that one of a pair of alternative acts which yields reinforcement with the lesser delay." (Hull, C.L., 1943).

shock experience relieved the anxiety for the next few trials, then the knowledge that the last trial was due motivated the subject to get it over with. (Interpretation mine.) Pilot data obtained from only two males and two females (Walsh, 1970) showed all subjects when allowed to self-administer a fixed number of unavoidable shocks, did so as soon as possible "to get it over with." Cook and Barnes also found two groupings of subjects in the high shock group: those who consistently selected immediate shock and those who consistently preferred delayed shock. Personality variables as well as stimulus variables were both probably contributing to findings. Church (1964) acknowledged that even rats may demonstrate different degrees of suppression because of individual differences in resistance to shock, or moment-to-moment variability of an individual rat.

Dale (1963) found a behavior pattern similar to that of Cook and Barnes with 142 students, where the UCS was verbal threat rather than electric shock. A quiz in an introductory psychology course has been graded and returned. All students were telephoned on a Sunday and told that the professor had raised some questions on their grades and on the adequacy of their answers. They were told the professor wanted to see them and would they telephone for an appointment: he was available from 8:00 to 5:00 Monday through Friday. Only 50 per cent of students called to make appointments: 46 for Monday; 19 for Tuesday; 5 for Wednesday, 1 for Thursday; 0 for Friday. Thus, the majority of students

chose immediate punishment rather than delayed punishment.

In another more comprehensive study, Cook and Bernard (1965) found that male and female subjects chose a short delay of punishment. They also found this was true for males (females not tested) whether shock was inevitable or probable (shocked on all 10 trials, 9 of 10 trials, 7 of 10 trials, 5 of 10 trials, 3 of 10 trials, 1 of 10 trials). They found that no psychophysiological measures (breathing rate, heart rate, GSR) related either to gradually increasing anxiety with expectation of UCS or to decreasing anxiety after UCS cessation. They did find a momentary change in GSR associated with CS (signal light) which they termed a measure of arousal and not of anxiety. Others (Lacey, 1959; Lang, 1968) have pointed out that there is frequently little correspondence in autonomic, verbal, or overt motor measures of anxiety. Discrepancies between physiological and verbal reports are common.

The nature of UCS is important. Camp, et al, (1967) found with rats that the greater the intensity of the punishment, the greater the suppression of appetitive response. Campbell, Smith and Misanin, (1966) demonstrated that punishment had more suppressing results on rat response with shock duration of 1.5 seconds than with 0.15 second duration. In the research with humans, electric shock has varied from 1.5 milliamps (MA) to 2.25 MA, with durations of 0.1 second to 1.0 second (see Table 1). Also, there have been fewer shocks (5 to 20) administered to humans than to rats (typically

TABLE 1

"SEVERITY OF A PUNISHMENT" OR AVERSIVENESS OF SHOCK WITH HUMANS. FACTOR NO. 1:
INTENSITY X DURATION. FACTOR NO. 2: FACTOR NO. 1 X NO OF SHOCKS

Studies	Sex	M: Mill-amp setting (MA)	D: Duration (Secs.)	Factor No. 1 M X D	S: No. Shocks Per subject	Factor No. 2 M X D X S	M Set by	Control Shock given by
Badia, et al, (1966)	(4F)(6M)	1.5 MA	1.0 sec.	1.5	10	15	E	E
Badia, et al, (1967)	(M)	Verbal meas. mod. aver. to pain aver. ?	1.0 sec.	---	20	---	E	E
Banks & Vogel-Sprott, (1965)	(M)	2.25 MA	0.5 sec.	1.125	3-14	3.38-15.7	E	E
Cook & Barnes, (1964)	(M)	"mild" ?	?	---	5	---	E	E
Cook & Bernard, (1965)	(F)(M)	"mild" ?	0.5 sec.	---	10	---	E*	E
D'Amato & Gumenik, (1960)	(F)(M)	1.5 MA (to 5 MA in 4 Ss)	0.1 sec.	0.15	?	---	E*	E
Haggard, (1943)	(M)	MA ? (400 volts-18 mi-croamps)	Frac. sec. ?	---	5	---	E	$\frac{1}{2}$ by E $\frac{1}{2}$ by S
Kimmel & Pennypacker, (1962)	(M)	(50 V) 2.0 MA	0.1 sec.	0.2	9-21	1.8-4.2	E	E
Morrow, M.C., (1966)	(F)(M)	1.5 MA	0.1 sec.	0.15	20	3.0	E	E
Fervin, (1963)	(M)	Recorded but not given	0.25 sec.	---	12	---	$\frac{1}{2}$ by E $\frac{1}{2}$ by S	$\frac{1}{2}$ by E $\frac{1}{2}$ by S
Walsh, (1970) (Pilot)	(2M)	3.2 MA (aver. age)	2.5 sec.	3.75-8.0	20	75-160	S	S
	(2F)	1.5 MA (aver. age)						

*Intensity setting raised by E (S unaware).

¹Terminology suggested by Church, et al., 1967.

in the 100's, e.g. 132 in Perkins, et al, (1963). The small protoplasmic mass of the rat gets more shocks at higher intensities for longer durations than humans. We know more about punishment with rats than we do with humans. Solomon (1964) has pleaded for more research on punishment with humans. Perhaps there should be a UCS factor (intensity x time x number of shocks) to guide future meaningful human punishment experiments. One of the findings of implosive therapists is that humans can endure much more anxiety than therapists had thought. Church, et al, (1967) suggested an operational term "severity" of punishment, consisting of $MA \times time$. They found that intensity and duration combine in a simple fashion, and that severity was directly related to the amount of response suppression in rats. It would be helpful if such information were included in every published research for both animal and human subjects.

Few studies with humans have been concerned with anxiety in an unavoidable shock situation where the subject could self-administer the shock. Haggard (1943) compared nine "E-shock" (experimenter-administer shock) subjects with nine "S-shock" (self-administer shock) subjects in a test situation where all subjects were read 42 stimulus words among which a two-word sequence "sharp, sword" was randomly presented five times. Shock followed "sharp, sword" for all subjects, but the S-shock subjects were also given a signal light. Haggard found that subjects who could self-administer shocks showed significantly less anxiety, as

measured by GSR, than did subjects given shock by experimenter. A post-test session showed the S-shock subjects to have more accurate estimates of the number of shocks given and the number of stimulus words presented. Pervin (1963) tested humans in combinations of shock in a 3 x 2 experimental design: signal, no signal, inconsistent signal and "control" (self-administer shock), "no control." After presentation of each pair of conditions, subject expressed a preference for one of the conditions. Paired comparison data showed significant preferences for: signal vs. no-signal; signal vs. inconsistent signal; inconsistent signal vs. no-signal. These preferences decreased over sessions. They also found a control vs. no-control to be significant for only the second of three sessions. Post-test paper and pencil subjective ratings showed more pain and anxiety with no control (experimenter administered shock), but the ratings were not significant statistically.

This review of the literature has shown that some of the pertinent variables in the human punishment situation are: (1) presence or absence of a warning signal; (2) time of onset of UCS, whether immediate, fixed delay, or variable delay, following a signal; (3) probability of the UCS; (4) controllability of the UCS by subject; (5) duration of the UCS; (6) intensity of the UCS; (7) number of UCS's. Not much is known about the last four variables.

In most of the studies, a small number of shocks has been presented at a low or unknown intensity and for a

short duration. Only a few studies have considered self-administration of the shocks.

Lockard (1963) associated the word "predictable" with a warning signal for shock, and she showed that rats spent most of their time on the predictable side of the box. Humans have also been more anxious in unpredictable situations (Pervin, 1963). Predictability is a variable which has not been studied sufficiently with humans.

Problem and Hypotheses

The present study examined the effects of the predictability variable of shock in a situation in which 20 unavoidable shocks were administered. The subjects had the option of self-administering any of the 20 shocks in either the predictable or unpredictable situations. Predictability was varied in two conditions. Condition No. 1 was one in which the subject saw an electric timer and knew when the shock would be administered automatically. Condition No. 2 was one in which the timer was covered, and, thus the subject did not know exactly when the shock would occur. In both conditions, the subject was able to self-administer shock by pressing a button, and the shock level was set by the subject himself. It was hypothesized that low-predictability subjects (no CS, i.e., no visible timer) would:

- (1) self-administer more shocks.
- (2) attempt to self-administer more shocks. (Because of UCS duration of $2\frac{1}{2}$ seconds, there may be ineffective attempts to self-administer shocks.)

- (3) receive the allotted number of shocks in less time.
- (4) be more anxious.
- (5) It was also hypothesized that all subjects would set their own levels of UCS intensity at a higher level than established in the literature.

The dependent variables were:

- (1) measure of time to take all shocks;
- (2) the number of effective self-administered shocks;
- (3) the number of attempts to self-administer shocks;
- (4) the shock levels set by the subjects;
- (5) paper and pencil measures of "state" anxiety as measured by: (A) Zuckerman's Multiple Affect Adjective Check List, and (B) Wolpe's self-rating SUD scale;
- (6) Post-test subjective reports.

Method

Subjects

Subjects were 10 male (mean age 25.9 years) and 10 females (mean age 27.8 years) graduate student volunteers from the University of Rhode Island. Both male and female subjects were randomly assigned in equal numbers to the two conditions of timer visible and timer covered.

Apparatus

The apparatus consisted of a C.J.A. Model 250

Stimulator Unit which produced a constant current stimulus of 0 to 5 Ma. Standard programming equipment was used consisting of timers, relays, pulse duration controls, and a hand push button. UCS (electric shock) was given through two electrodes inserted in a leather wrist cuff attached to the wrist of the non-preferred hand. There was one counter to record the number of shocks taken automatically; another counter registered the total of self-administered shocks plus the total attempts to self-administer shocks. The subject was run in an isolated room.

Procedure

Subjects were run individually. In the pre-test situation, they were first given the Zuckerman Multiple Affect Adjective Check List and asked to respond on the basis of whether the adjective describes them "now." They were also asked to rate themselves on present state of anxiety on the Wolpe SUD scale. They were asked to check quickly their normal toleration for pain as being "low," "medium," or "high." Then the following instructions were given:

Standard Instructions for Condition No. 1 (High Predictability)

1. Please sit in the chair in front of the apparatus.
2. This is an experiment in which you cannot avoid or escape shock. You are assured that no danger is involved.
3. The experimenter will assist you in attaching to your non-preferred wrist a cuff containing two electrodes.

Electrode jelly will be applied to insure good conductance.

4. Adjust Knob A of the apparatus (dial covered so setting is not visible to subject, but may be recorded by experimenter) until you feel a stimulus which you rate as aversive to you. There will be a two-minute interval after the first 10 shocks when you will be asked to reestablish a level of aversiveness.

5. You will be given a total of 20 shocks, one shock administered every 30 seconds. Each shock lasts $2\frac{1}{2}$ seconds.

6. Please observe Timer B. It will indicate to you the passage of 30 seconds.

7. Hold this push-button in your other hand. This button gives you control of the shock. If you push the button, the shock is presented immediately and will last for $2\frac{1}{2}$ seconds after which the timer resets and begins a new 30 second cycle. You will receive a total of 20 shocks whether you push the button or not.

8. Please concentrate and do not ask questions during the experiment.

Standard Instructions for Condition No. 2 (Low Predictability)

The instructions were the same as for Condition No. 1, except in item No. 6 (above). Subjects were shown a timer, then it was covered, and subjects were told not to attempt to count.

All subjects of both groups were given the Wolpe SUD scale during the two-minute interval after the first 10 shocks, and again after the second 10 shocks. Condition No. 1

subjects, in post-test, were asked to describe their anxiety, if any, as "increasing," "the same," or "decreasing" as they watched the approaching end of 30 seconds on the timer.

All subjects of both Conditions were asked if they could have tolerated more than 20 shocks, and if so, (1) to give an estimate of how many; (2) would they have preferred experimenter to have set the intensity of shock; (3) could they have endured, without too much discomfort, a higher intensity of shock, and (4) was the shock a pain or pleasure experience.

Results

Because the sample in each cell was small ($N=5$) and the data appeared scattered, a statistical test of homogeneity of variance (conditions $\times$ trials $\times$ sex) was performed; the result was homogeneity for the data of time ($p>.05$).

Number of self-administered shocks

Table 2 shows the means of the effective number of self-administered shocks. The means tended to show no difference in high predictability vs. low predictability. Females appeared to have self-administered fewer shocks than males for trials 1-10, but they self-administered the same number of shocks as males in trials 11-20. The means were higher for both sexes in trials 11-20. An analysis of variance (three factor mixed design, predictability, sex, trials, with repeated measures on one factor, trials) of the data showed no difference between high-predictability

TABLE 2

MEANS OF NUMBER OF SELF-ADMINISTERED SHOCKS

	High Predictability			Low Predictability		
	Trials 1-10	Trials 11-20	Average	Trials 1-10	Trials 11-20	Average
Males	8.4	9.4	8.9	9.6	9.8	9.7
Females	7.6	10.0	8.8	7.2	8.6	7.9
Totals	8.0	9.7	8.85	8.4	9.2	8.8

and low predictability ($F < 1$: see mean squares, Appendix, page 51). Although females self-administered fewer shocks than males this was not significant ($F = 3.37$, $df\ 1/16$, $p < .10$: see mean squares, Appendix, page 51). There were more self-administered shocks in trials 11-20 than in trials 1-10 ($F = 7.66$, $df\ 1/16$, $p < .025$). This difference was not significant for sex ($F = 2.06$) or for conditions of predictability ($F < 1$). The amount of difference was not significant for sex ($F = 1.64$) or for predictability ($F = 1.64$: see mean squares, Appendix, page 53).

Because there was no trial-to-trial data collected, and because the above statistics compared trials 1-10 with trials 11-20 as two groups, it was decided to look at total data for all 20 trials. A treatment by levels design of analysis of variance on the total number of self-administered shocks for all subjects for all trials showed an interaction effect (see Figure 1): females with low predictability self-administered fewer total shocks (took more shocks automatically) than females with high predictability, also fewer total self-administered shocks than males in both conditions ($F = 7.68$, $df\ 1/16$, $p < .025$: see mean squares, Appendix, page 52).

Number of attempts to self-administer shocks

The means of attempts to self-administer shocks are shown in Table 3. They showed females attempting to self-administer fewer total shocks than males in both conditions. The means for females are all smaller than the means for

Fig. 1. Interaction effect between sex and predictability on total number of self-administered shocks.

TOTAL NUMBER OF SELF-ADMINISTERED SHOCKS (TRIALS 1-20)

TABLE 3

MEANS OF NUMBER OF ATTEMPTS TO
SELF-ADMINISTER SHOCK

	High Predictability			Low Predictability		
	Trials 1-10	Trials 11-20	Trials 1-20	Trials 1-10	Trials 11-20	Trials 1-20
Males	10.0	9.4	9.7	9.6	9.8	9.7
Females	9.0	10.0	9.5	7.4	8.8	8.1
Totals	9.5	9.7	9.6	8.5	9.3	8.9

males, except in trials 11-20 in high predictability. The total means (both sexes) are smaller for trials 1-10 than for trials 11-20. An analysis of variance (treatments x levels) on the data for totals for trials 1-20 showed no significant difference between high predictability and low predictability ($F=1.34$) or between sex ($F=2.2$; mean squares, Appendix, page 54). For trials 1-10 only, there was no significance for predictability variable ($F<1$), or for sex variable ($F=2.31$; mean squares, Appendix page 55). For trials 11-20 only, $F<1$ for both sex and predictability; F was 2.06 and $p>.10$ for interaction (see mean squares, Appendix, page 56).

Time

The means of the amount of time in seconds taken by subjects in the experiment are shown in Table 4. The means tend to show that all subjects took less time for the second 10 trials; they also show that while the total time for twenty trials is the same for the two conditions, females took much longer time in Condition No. 2 (low predictability). The data were treated to an analysis of variance (three factor mixed design, predictability, sex. trials, with repeated measures on one factor, trials). Results showed no difference for high predictability vs. low predictability ($F<1$). While females tended to take longer total time than males for all trials for both conditions, this difference was not significant ($F=3.8$, df 1/16,

TABLE 4
 MEANS OF AMOUNT OF TIME IN SECONDS TAKEN
 DURING TRIALS

	High Predictability			Low Predictability		
	Trials 1-10	Trials 11-20	Trials 1-20	Trials 1-10	Trials 11-20	Trials 1-20
Males	120.2	81.2	100.7	51.9	31.3	41.6
Females	127.1	58.9	93.0	170.1	129.8	149.9
Totals	123.6	70.05	96.85	111.0	80.55	95.75

$p < .10$). There was an interaction effect (see Figures 2 and 3) for both trials 1-10 and trials 11-20: females took longer time than males in the low predictability condition ($F=5.06$, $df\ 1/16$, $p < .05$). Both male and female subjects took less time in both conditions in trials 11-20 than they did in trials 1-10 ($F=12.01$, $df\ 1/16$, $p < .005$; see mean squares, Appendix page 57).

Table 5 shows the percentage of maximum allotted time for each 10 trials if all shocks were taken automatically every 30 secs. with each shock lasting 2.5 secs. (total 325 secs.). A treatment by levels design of analysis of variance on the amount of change in time between trials 1-10 and trials 11-20 was not significant for high predictability vs. low predictability ($F=1.56$) or for sex ($F=2.21$, $df\ 1/16$, $p > .10$; mean squares, Appendix page 58).

Anxiety measures

To see if the two instruments were measuring the same state anxiety, a Pearson Product-Moment Correlation was run between scores of the Zuckerman Multiple Affect Adjective Check List and scores on the Wolpe self rating SUD Scale: there was significant correlation ($r=.4924$, $df\ 18$, $p < .05$).

Wilcoxon t-tests showed all subjects (both conditions) to have lowered their SUD anxiety ratings significantly after the first 10 trials ($p < .05$, 2 tail) and again after the last 10 trials ($p < .01$, 2 tail). Therefore, anxiety

Fig. 2 Interaction effect between sex and predictability on total time in seconds taken for trials 1-10.

Fig. 3 Interaction effect between sex and predictability on total time in seconds taken for trials 11-20.

TOTAL TIME IN SECONDS (TRIALS 11-20)

TABLE 5

PERCENTAGES OF MAXIMUM ALLOTTED TIME (325 secs).

FOR EACH 10 TRIALS TAKEN BY SUBJECTS

	High Predictability			Low Predictability		
	Trials 1-10	Trials 11-20	Trials 1-20	Trials 1-10	Trials 11-20	Trials 1-20
Males	36.04%	25.04%	30.54%	15.96%	9.62%	12.79%
Females	39.08%	18.14%	28.61%	52.18%	39.96%	46.07%
Totals	37.56%	21.59%	29.58%	34.07%	24.79%	29.43%

as measured by Wolpe's SUD scale was being uniformly lowered for all subjects after the first 10 trials and again after the next 10 trials.

Because $r=.4924$ is low, separate statistical tests were applied to the Wolpe SUD scale measures and to the Zuckerman measures. A Mann-Whitney U Test showed no significant differences between males and females in SUD Scale ratings during pre-test before trial 1 or in the interval after trials 1-10. There was a difference in the Zuckerman scores. Females were more anxious than males when Zuckerman scores (see Table 6 for means) were submitted to a treatment by levels analysis of variance ($F=8.19$, $df\ 1/16$, $p<.001$: see mean squares Appendix, page 59); and also significant with a t test ($t=2.614$, $df\ 18$, α beyond .02, 2 tail). The mean for females in low predictability is the highest of all indicating they were more anxious than both males and females in either condition.

Millamp settings

The means of milliamp levels set by subjects are shown in Table 7. Both males and females had a higher mean shock level for trials 11-20 than they did for trials 1-10. The means for both sexes were almost the same for trials and conditions. The means for low predictability are higher than for high predictability. The data did not vary as a function of high predictability vs. low predictability, or of sex, but did as function of trials (analysis of variance

TABLE 6
MEAN ANXIETY SCORES ON ZUCKERMAN MULTIPLE
AFFECT ADJECTIVE CHECK LIST

	High Predictability	Low Predictability	Total
Males	4.2	5.2	4.7
Females	6.4	9.4	7.9
Total	5.3	7.3	6.3

$F=17.92$, $df\ 1/16$, $p<.001$: see mean squares, Appendix, page 60).

A series of Pearson Product-Moment Tests on the data showed no correlations between measures of anxiety (neither Zuckerman nor Wolpe) with measures of time, milliamp settings, or number of self-administered shocks (see Appendix, page 62).

Paper and pencil data

These results appear in Tables 8 and 9. The data in Table 9 were rated by four judges: + for pleasure, - for pain, = for equal or midway between pain and pleasure. The judges were two professors of psychology and two practising clinical psychologists. A statistical test for the difference between proportions on the judges' ratings showed that three females out of five in low predictability condition experienced the shock experience as pleasure ($z=-2.0$, $p=.05$, 2 tail).

Discussion

The results of this study showed that human subjects, when faced with inevitable punishment, and given a high degree of controllability of that punishment, behave the same way whether the punishment is predictable or non-predictable. The low predictability subjects (no warning signal) did not self-administer more shocks than the high predictability subjects as hypothesized; nor did they attempt to self-administer more shocks. While others

TABLE 9

SUBJECTIVE POST-TEST DESCRIPTIONS OF
SHOCK EXPERIENCE

Males High Predicta- bility	<ol style="list-style-type: none"> 1. Pain 2. Pain 3. Slight Pain 4. Aversive--to pain 5. At first pleasurable, then less so
Females Low Predicta- bility	<ol style="list-style-type: none"> 6. Second half was relatively higher shock than first half (Couldn't go too far beyond second half) 7. Mid way between pain and pleasure 8. Pain 9. Pain 10. Pain--discomfort
Males Low Predicta- bility	<ol style="list-style-type: none"> 11. Slight pain 12. More or less displeasure 13. It wasn't pleasure, but not pain 14. Combination. Not aversive, but different 15. Anxiety provoking--aversive
Females Low Predicta- bility	<ol style="list-style-type: none"> 16. Started as pain, then intriguing and pleasurable 17. Mixture of both,--more toward pleasurable. Overwhelming desire not to wait at shock No. 5 18. Irritating. Seemed milder 2nd half 19. Pain 20. Pleasure

Lockard, 1963; Perkins et al, 1963; Badia, 1967; Knapp et al, 1959) have shown that receiving shocks without a warning signal is more aversive, and while in this experiment the absence of a timer (low predictability) should have been more aversive, the results in this experiment concerning high vs. low predictability showed no difference. The difference in conditions may have been negated by the element of controllability. Subjects in both conditions had the same opportunity to push the button and self-administer shocks, which they did. This finding lends support to the studies of Haggard (1943) and Pervin (1963) who showed that human subjects preferred self-administered vs. experimenter-administered shocks. Perhaps the expected effect of aversiveness because of no warning signal in this study could have been accentuated by having the behavior of subjects pushing the button followed by delayed shock, either fixed delay or variable delay, rather than by immediate shock. D'Amato and Gumenik (1960) had found randomly delayed shock to be more aversive and unpleasant than immediate shock. Research investigating the delay of shock along with an element of controllability such as was present in this experiment has not been done.

The results of this experiment also showed that all subjects preferred to shock themselves rather than wait for automatically delayed shocks, and that this preference increased over trials. The subjects gave themselves an average of 8.2 out of the 10 possible shocks over the first 10 trials, and this increased to an average of 9.45 shocks

for the next 10 trials. Subjects were shocked during pre-trial when establishing a level of aversity. Several shocks were required pre-trial, because the experimenter had the subjects experience the quick onset and duration of a shock at whatever level was set because this quick onset was different from the aversive experience of slowly, gradually increasing the shock level. Obviously, adaptation was occurring. It might also be said that adaptation was taking place in the experimental condition over trials because 18 of 20 subjects set their MA level higher for the second 10 trials. After running all subjects, the author has speculated that, because of the pre-trial shocks, the subjects were possibly starting trials 1-10 with "learned helplessness," such as reported by Overmeir and Seligman (1967) who found that prior exposure of dogs to inescapable shock resulted in interference with subsequent escape/avoidance learning.

Since the number of self-administered shocks in a fixed number of shocks situation tends to be related directly to the amount of time taken to receive the shocks, the data on time also did not distinguish the low and high predictable subjects. It is an unfortunate limitation of the design that trial-to-trial data were not recorded.

Seventeen of twenty subjects took less time for the second ten trials. Since no trial-to-trial data were collected, it is not known whether this behavior may have followed the U-shaped curve reported by Cook and Barnes (1964),

but this finding suggests that in trials 11-20 the knowledge that the last trials were due may have motivated subjects "to get it over with." It is interesting as shown in Figure 1 that females in low predictability self-administered significantly fewer shocks than males, and also (Figures 2 and 3) spent significantly longer total time than males in both trials 1-10 and trials 11-20. This would suggest that the design of low predictability, rather than having created more aversiveness, effectively created less aversiveness for females in spite of the fact that their "severity" of punishment was higher. This is contrary to the results of Cook and Bernard (1965) who found no sex differences in choosing a short delay of unavoidable punishment following a CS (light), even though they did report in females significantly more heart beats, fewer breaths, and higher GSR readings. (We are reminded that there is frequently no correlation between psychophysiological behavior and operant behavior.) Badia et al (1966) also reported no behavioral differences in sex in shock conditions. Therefore, a check on the raw data was made; the results showed that four of the females randomly assigned to low predictability were 22 years of age and that the fifth was age 43. Further analysis of the Zuckerman scores alone showed that these females had the highest anxiety scores. This is not to say that these females were "high anxious" or even "moderately severe" anxious. Zuckerman referred to scores of up to 8 as normal, and to scores of 8-12 as being of the "mild clinical anxiety"

type, such as to be expected in a "stress response related to stage fright, perceptual isolation, or (facing) an expected examination." This result may appear confusing because the two measures of anxiety correlated statistically, and because there were no statistical differences in the ratings on the Wolpe SUD ratings. But, while significant, the correlation between Zuckerman and Wolpe SUD was low, $r=.4924$, and only 24 per cent of the variance was accounted for. It also suggests that the Zuckerman test is a more sensitive instrument for measuring state anxiety, because the females in low predictability experienced the experimental shocks as pleasurable.

Since the author asked no further questions of the subjects who experienced shock as pleasure, any explanation is tenuous. Also, the statistic to establish this "pleasure" is not robust, and the sample is small (N-5). These subjects were more anxious, and they were in the more aversive of the two conditions: they had no CS (timer). Perhaps this low predictability increased their already higher state anxiety. The reduction of this higher anxiety by punishment may have been greater relative to the anxiety reduction of the other subjects who experienced pain, so much so that they sensed the punishment as tremendous relief, even pleasure. The fact that they also took longer time for the allotted number of shocks suggests that they may have preferred to experience this pleasure as long as possible between shocks. The evidence in this study that females

with higher anxiety self-administered fewer shocks, took longer time in the shock situation, and found the experience one of pleasure rather than of pain, suggest that more extensive research would be appropriate with a larger sampling of subjects, both sexes divided equally between measures of high and low anxiety.

Also, in a self-punishing, unavoidable situation, might there be variances of the numbers of self-administered shocks and amount of time spent to take shocks that would discriminate between "normal" and special populations of high anxiety such as alcoholics, suicidals, self-mutilators, neurotics, psychotics, and sociopaths?

The studies of Cook and Barnes (1964) and Cook and Bernard (1965) showed that subjects "tended to chose a shorter delay" when faced with inevitable shock; they also use the phrase that subjects "rush into shock." In this research, the subjects took 35.8 per cent of the allotted maximum time for the first 10 shocks and 23.2 per cent for the second 10 shocks, for an average of 29.5 per cent of the maximum time (see Table 5): these results do not justify the phrase that subjects are rushing into shock. Since Cook and Barnes did not assess state anxiety, it is not known how their subjects compared with the subjects in this study.

The average milliamp setting quoted in the literature (Table 1) is 1.75 MA, and the average shock duration is 0.36 seconds. These combine in an average "severity" of

punishment (Church et al, 1967) of 0.63 (1.75 MA x 0.36 seconds). The results of this study show that "severity" of punishment for females was 6.88 (2.75 MA x 2.5 seconds); for males 7.5 (3.0 MA x 2.5 seconds); and for all subjects 7.19 (2.875 MA x 2.5 seconds). Thus, the hypothesis is supported that subjects when allowed to establish their own levels of electric shock will do so at a higher level than that established in the literature. A confounding contribution to these results may be the fact that electrode jelly was applied to the wrist to enhance conductance. Research by Green (1962) shows that shock threshold increased eight per cent with electrode jelly when using constant current (microamps). Therefore, the data were lowered by eight per cent, and the hypothesis was still supported: the total average MA setting for all subjects (Table 7) was reduced from 2.87 MA to 2.645 MA, and the "severity" of punishment lowered to 6.61. Green also showed that with constant voltage, not microamps, the shock threshold was lowered by 60 per cent. The voltage for shocks cited in the literature is not always known. Therefore, the plea for universality of electric shock when used in research with humans should remain, and all published studies should report voltage, current, duration, and whether or not electrode jelly is used.

There are other results, which, though not significant at the $P < .05$ level, tended also to suggest sex differences. Females tended to self-administer fewer shocks for all trials ($F=4.25$, $p < .10$) and females tended to take

longer time for all trials ($F=3.87$, $p<.10$). The amount of time change for trials 11-20, as against trials 1-10, appeared less for females than for males ($F=2.21$, $p>.10$). The two hypotheses that low predictability subjects would: (1) self-administer more shocks, and would; (2) take less time in the shock situation, were not supported. Because females were more anxious, it is possible that not sex per se contributed to non-support of the hypotheses, but state anxiety; anxiety measures were not accounted for in randomly assigning subjects to cells. Also, because of the sampling artifact of $N=5$ in each of the four cells, replication of this study with a larger sample seems justified, before denying or discarding any of the hypotheses.

This study has been the first to combine high controllability (all subjects set their own shock levels; and all subjects could self-administer shocks) with a fixed number of unavoidable shocks of long duration (2.5 seconds) with and without a CS (timer). In spite of its limitations, it makes an important contribution to the psychology literature in suggesting methodology for future research. It also adds to the knowledge of human shock: all 20 subjects could have tolerated more than 20 shocks, with at least 10 subjects reporting toleration for from 30 more shocks to more shocks in the hundreds. Even though the "severity" of punishment was high, 16 subjects claimed they could have endured a higher intensity of shock, and only two of 20 subjects would have preferred the experimenter to have established the shock level, even though toleration for pain (medium, high, low)

appeared to be equally distributed (Table 8).

The limitations of this study have been mentioned. Until there is additional research as has been suggested, generalizations of the results would have to be limited to a similar biased sampling of subjects.

APPENDIX

Picture of Apparatus

NAME

GROUP

S#

MOST RELAXED
EVER BEEN

MOST ANXIOUS
EVER BEEN

1.

0

25

50

75

100

2.

3.

BEFORE

NOW

WOLPE'S SUD SCALE

MULTIPLE AFFECT ADJECTIVE CHECK LIST

IN GENERAL FORM

By Marvin Zuckerman
and
Bernard Lubin

Name..... Age..... Sex.....

Date..... Highest grade completed in school.....

DIRECTIONS: On this sheet you will find words which describe different kinds of moods and feelings. Mark an ☒ in the boxes beside the words which describe how you generally feel. Some of the words may sound alike, but we want you to check all the words that describe your feelings. Work rapidly.

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☐ active	45 ☐ fit	89 ☐ peaceful
☐ adventurous	46 ☐ forlorn	90 ☐ pleased
☐ affectionate	47 ☐ frank	91 ☐ pleasant
☐ afraid	48 ☐ free	92 ☐ polite
☐ agitated	49 ☐ friendly	93 ☐ powerful
☐ agreeable	50 ☐ frightened	94 ☐ quiet
☐ aggressive	51 ☐ furious	95 ☐ reckless
☐ alive	52 ☐ gay	96 ☐ rejected
☐ alone	53 ☐ gentle	97 ☐ rough
☐ amiable	54 ☐ glad	98 ☐ sad
☐ amused	55 ☐ gloomy	99 ☐ safe
☐ angry	56 ☐ good	100 ☐ satisfied
☐ annoyed	57 ☐ good-natured	101 ☐ secure
☐ awful	58 ☐ grim	102 ☐ shaky
☐ bashful	59 ☐ happy	103 ☐ shy
☐ bitter	60 ☐ healthy	104 ☐ soothed
☐ blue	61 ☐ hopeless	105 ☐ steady
☐ bored	62 ☐ hostile	106 ☐ stubborn
☐ calm	63 ☐ impatient	107 ☐ stormy
☐ cautious	64 ☐ incensed	108 ☐ strong
☐ cheerful	65 ☐ indignant	109 ☐ suffering
☐ clean	66 ☐ inspired	110 ☐ sullen
☐ complaining	67 ☐ interested	111 ☐ sunk
☐ contented	68 ☐ irritated	112 ☐ sympathetic
☐ contrary	69 ☐ jealous	113 ☐ tame
☐ cool	70 ☐ joyful	114 ☐ tender
☐ cooperative	71 ☐ kindly	115 ☐ tense
☐ critical	72 ☐ lonely	116 ☐ terrible
☐ cross	73 ☐ lost	117 ☐ terrified
☐ cruel	74 ☐ loving	118 ☐ thoughtful
☐ daring	75 ☐ low	119 ☐ timid
☐ desperate	76 ☐ lucky	120 ☐ tormented
☐ destroyed	77 ☐ mad	121 ☐ understanding
☐ devoted	78 ☐ mean	122 ☐ unhappy
☐ disagreeable	79 ☐ meek	123 ☐ unsociable
☐ discontented	80 ☐ merry	124 ☐ upset
☐ discouraged	81 ☐ mild	125 ☐ vexed
☐ disgusted	82 ☐ miserable	126 ☐ worm
☐ displeased	83 ☐ nervous	127 ☐ whole
☐ energetic	84 ☐ obliging	128 ☐ wild
☐ enraged	85 ☐ offended	129 ☐ wise
☐ enthusiastic	86 ☐ outraged	130 ☐ wrong
☐ fearful	87 ☐ panicky	131 ☐ worrying
☐ fine	88 ☐ patient	132 ☐ young

NAME _____ M _____ F _____ AGE _____ S# _____

GROUP # 1 _____ # 2 _____

OPERATIONAL
SEQUENCE

3. Knob "A" Setting _____ MA.
5. Knob "A" Setting _____ MA.
7. End of Test Counter Reading _____ (#Shocks)
1. Wolpe Sud Scale (Anxiety) _____
2. "Would you describe your normal toleration for pain as:
LOW _____, MEDIUM _____, HIGH _____?"
4. Wolpe Sud Scale (Anxiety) _____
(2 Min. Int.)
6. Wolpe Sud Scale (Anxiety) _____
8. (Group #1 ONLY). "As you watched the approaching end
of 30 seconds on time "B", describe your anxiety, if
any as INCREASING _____, SAME _____,
DECREASE _____."
9. "Could you have tolerated more than 20 shocks?"
YES _____, NO _____, IF YES, HOW MANY _____?
10. "Would you have preferred E to have set intensity of
shock? YES _____, NO _____?"
11. "Could you have endured a higher intensity of shock
without too much discomfort? YES _____, NO _____?"
12. "Was this shock a pain or pleasure experience?"

ANALYSIS OF VARIANCE ON SCORES OF NUMBER
OF SELF-ADMINISTERED SHOCKS

Source	df	SS	MS	F
Total	39	113.73		
Between S's	19	59.28	3.12	1.16
Pred.	1	0.03	0.03	0.01
Sex	1	9.03	9.03	3.37*
Pred. x Sex	1	7.22	7.22	2.69 .
Error (B)	16	43.00	2.68	
Within S's	20	54.50	2.73	1.34
Trials	1	15.63	15.63	7.66**
Trials x Pred.	1	2.02	2.02	0.99
Trials x Sex	1	4.22	4.22	2.06
Trials x Pred. x Sex	1	0.03	0.03	0.14
Error (w)	16	32.59	2.04	

* $P < .10$

** $P < .025$

ANALYSIS OF VARIANCE ON TOTAL NUMBER OF SELF-
 ADMINISTERED SHOCKS FOR TRIALS
 1-10 PLUS TRIALS 11-20

Source	df	SS	MS	F
Total	19	118.55		
Predictability	1	0.05	0.05	0.01
Sex	1	18.05	18.05	4.25*
Predictability x Sex	1	32.55	32.55	7.68**
Error	16	67.90	4.24	

* $P < .10$

** $P < .025$

ANALYSIS OF VARIANCE ON AMOUNT OF CHANGE OF
SELF-ADMINISTERED SHOCKS BETWEEN
TRIALS 1-10 AND TRIALS 11-20

Source	df	SS	MS	F
Total	19	72.55		
Predictability	1	6.05	6.05	1.64
Sex	1	6.05	6.05	1.64
Predictability x Sex	1	0.45	0.45	0.12
Error	16	60.00	3.75	

ANALYSIS OF VARIANCE ON TOTAL NUMBER OF ATTEMPTS
TO SELF-ADMINISTER SHOCK (TRIALS 1-20)

Source	df	SS	MS	F
Total	19	153		
Predictability	1	9.8	9.8	1.34 N.S
Sex	1	16.2	16.2	2.21 N.S
Predictability x Sex	1	9.8	9.8	1.34 N.S
Error	16	117.2	7.325	

ANALYSIS OF VARIANCE ON TOTAL NUMBER OF ATTEMPTS
 TO SELF-ADMINISTER SHOCK FOR
 TRIALS 1-10 ONLY

Source	df	SS	MS	F
Total	19	108		
Predictability	1	5.0	5.0	0.904 N.S.
Sex	1	12.8	12.8	2.31 N.S.
Predictability x Sex	1	1.8	1.8	0.325 N.S.
Error	16	88.4	5.53	

ANALYSIS OF VARIANCE ON TOTAL NUMBER OF ATTEMPTS
TO SELF-ADMINISTER SHOCK FOR
TRIALS 11-20 ONLY

Source	df	SS	MS	F
Total	119	29.0		
Predictability	1	0.8	0.8	<1
Sex	1	0.2	0.2	<1
Predictability x Sex	1	3.2	3.2	2.06*
Error	16	24.8	1.55	

* $P > .10$

ANALYSIS OF VARIANCE ON TIME IN SECS. (CONDITIONS,
BY SEX, BY TRIALS, WITH REPEATED MEASURES)

Source	df	SS	MS	F
Total	39	209,388		
Between S's	19	165,493.71		
Pred.	1	11.77	11.77	< 1
Sex	1	25,285.81	25,285.81	3.8*
Pred. x Sex	1	33,703.83	33,703.83	5.06**
Error (b)	16	106,492.3	6,655.7	
Within S's	20	43,894.29		
Trials	1	17,593.83	17,593.83	12.01***
Trials x Pred.	1	1,319.06	1,319.06	0.90
Trials x Sex	1	1,499.41	1,499.41	1.02
Trials x Sex x Pred.	1	57.83	57.83	< 1
Error (w)	16	23,424.16	1,464.01	

* $P < .10$

** $P < .05$

*** $P < .005$

ANALYSIS OF VARIANCE ON AMOUNT OF CHANGE IN TIME
BETWEEN TRIALS 1-10 AND TRIALS 11-20

Source	df	SS	MS	F
Total	19	2843.25		
Predictability	1	223.79	223.79	1.56
Sex	1	315.84	315.84	2.21*
Predictability x Sex	1	15.61	15.61	< 1
Error	16	2288.01	143.00	

* $P > .10$

ANALYSIS OF VARIANCE ON ZUCKERMAN MULTIPLE AFFECT
ADJECTIVE SCORES OF ANXIETY

Source	df	SS	MS	F
Total	19	186.2		
Predictability	1	20.0	20.0	3.2
Sex	1	51.2	51.2	8.19*
Predictability x Sex	1	15.0	15.0	2.4
Error	16	100.0	6.25	

* $P < .001$

ANALYSIS OF VARIANCE ON SHOCK LEVELS (MILLIAMPS;
 DATA TRANSPOSED TO MICROAMPS) SET BY SUBJECTS
 (2 X 2 X 2 ANOVA, WITH REPEATED
 MEASURE ON ONE FACTOR).

Source	df	SS	MS	F
Total	39	710,834.73		
Between Ss	19	631,726.28	33,248.75	<1
Pred.	1	44,222.23	44,222.23	1.22
Sex	1	7,425.63	7,425.63	<1
Pred. x Sex	1	140.62	140.62	<1
Error (b)	16	579,737.80	36,233.6	
Within Ss	20	79,108.50	3,955.42	1.95
Trials	19	36,421.23	36,421.23	17.92*
Trials x Pred.	1	5,130.22	5,130.22	2.52
Trials x Sex	1	4,100.62	4,100.62	2.02
Trials x Pred. x Sex	1	950.63	950.63	<1
Error (w)	16	32,505.80	2,031.61	

*P < .001

ANALYSIS OF VARIANCE ON AVERAGE MILLIAMP SETTINGS
 ($\frac{1}{2}$ SUM OF TRIALS 1-10 PLUS TRIALS 11-20)

Source	df	SS	MS	F
Total	19	146.03		
Predictability	1	75.12	75.12	17.23*
Sex	1	0.89	0.89	<1
Predictability x Sex	1	0.23	0.23	<1
Error	16	69.79	4.36	

*p < .001

PEARSON PRODUCT MOMENT CORRELATIONS

Zuckerman anxiety with SUD Scale anxiety	$r=.4924^{**}$
Zuckerman anxiety with interval SUD Scale anxiety	$r=.4115^{*}$
Zuckerman anxiety with post-experiment SUD Scale anxiety	$r=.1725$
Zuckerman anxiety with time (trials 1-10)	$r=.3241$
SUD Scale anxiety with time (trials 1-10)	$r=.1582$
Zuckerman anxiety with time (trials 11-20)	$r=.2780$
Zuckerman anxiety with time (trials 1-20)	$r=.3259$
Zuckerman anxiety with MA setting (trials 1-10)	$r=.0116$
Zuckerman anxiety with MA setting (trials 11-20)	$r=-.09$
Zuckerman anxiety with average MA setting	$r=-.0574$
MA setting with time, all subjects, (trials 1-10)	$r=.0226$
Total time with total MA settings (trials 1-20)	$r=.2941$
Males and females, MA settings, (trials 1-10)	$r=.2056$
Zuckerman depression with SUD Scale anxiety	$r=.45$
Zuckerman depression with interval SUD Scale anxiety	$r=.20$

** $P < .05$

* $p < .10$

INSTRUCTIONS TO JUDGES

S's received 20 shocks (electric).

They received 10 shocks in first half experiment.

Then 10 shocks after two min. interval.

After 20 shocks, they were asked to describe their experience as "Pain" or "Pleasure."

Attached are answers, which are variable.

Please assign to their responses either + (pleasure), or - (pain), or =(equal, midway between pain and pleasure)

RESULTS OF FOUR JUDGES'S RATINGS

	<u>Sign</u>	<u>Count</u>
1. Pain	-	4
2. Pain	-	4
3. Slight pain	-	4
4. Aversive--to pain	-	4
5. At first pleasurable, than less so	+ =	3 1
6. Second half was relatively higher (shock) than first half. Couldn't go too far beyond second half.	-	4
7. Midway between pain and pleasure	=	4
8. Pain	-	4
9. Pain	-	4
10. Pain--discomfort	-	4
11. Slight Pain	-	4
12. More or less displeasure	=	4
13. It wasn't a pleasure, but not pain	=	4
14. Combination.. Not aversive, but different	=	4
15. Anxiety provoking--aversive	-	4
16. Started as pain, then intriguing and pleasurable	+	4
17. Mixture of both--more toward pleasurable. Overwhelming desire not to wait at shock no. 5	+	4
18. Irritating. Seemed milder second half	-	4
19. Pain	-	4
20. Pleasure	+	4

HIGH PREDICTABILITY MALE

S	AGE	MAACL		H	PRE	SUD		POST	MILLIAMPS		TIME (sec)		TRIALS		TRIALS	
		A	D			INT			1	2	1	2	Counter	1-10	Counter	11-20
#15	22	2	8	4	50	20		17	3.50	4.01	69.3	66.4	0	10	0	10
#8	22	8	13	4	50	60		75	4.90	5.05	169.2	126.1	2	10	1	10
#4	28	6	13	7	20	24		22	0.65	0.85	83.3	66.6	1	13	1	10
#1	40	1	4	2	25	25		25	1.40	1.55	84.0	40.8	1	11	0	10
#5	25	4	8	2	40	35		35	1.60	3.00	195.0	197.0	4	14	1	10

LOW PREDICTABILITY MALE

S	AGE	MAACL		H	PRE	SUD INT	POST	MILLIAMPS		TIME (sec)		TRIALS 1-10		TRIALS 11-20	
		A	D					1	2	1	2	Counter 1 2	Counter 1 2	Counter 1 2	Counter 1 2
#16	23	8	10	5	65	60	50	1.40	1.65	83.2	25.4	0	10	0	10
#14	24	2	6	4	25	25	25	3.50	4.90	62.4	24.1	1	10	0	10
#13	23	8	12	5	50	25	19	3.00	3.00	26.8	55.0	0	10	1	10
#10	25	3	8	5	30	20	20	3.50	5.10	57.3	25.4	1	10	0	10
# 3	27	5	12	1	50	50	50	2.55	4.95	30.0	26.7	0	10	0	10

HIGH PREDICTABILITY FEMALE

	AGE	MAACL		H	PRE	SUD	INT	POST	MILLIAMPS		TIME (sec)	TRIALS		TRIALS		
		A	D						1	2		1-10	Counter		11-20	Counter
#11	42	10	16	11	60	37.5	37.5	37.5	2.80	3.00	47.2	44.8	0	10	0	10
# 7	27	8	12	4	75	25	25	25	3.15	3.80	253.7	98.7	7	10	0	10
# 2	30	2	7	1	35	35	35	35	2.50	3.10	83.2	46.3	1	10	0	10
#17	23	2	6	3	16	25	25	20	1.35	0.80	125.9	62.5	1	10	0	10
#18	24	10	16	6	50	35	35	15	1.60	2.06	125.2	42.5	3	17	0	10

LOW PREDICTABILITY FEMALE

S	AGE	MAACL		SUD	POST	MILLIAMPS		TIME (sec)		TRIALS		TRIALS		
		A	D			H	PRE	INT	1	2	1-10	Counter	11-20	Counter
# 6	22	8	19	3	35	25	4.40	5.00	67.9	60.1	1	11	0	10
# 9	23	10	14	3	60	50	2.20	2.45	230.7	262.2	3	10	5	10
#12	43	10	12	8	35	40	1.70	1.95	222.7	53.5	5	10	0	10
#19	22	8	7	3	25	40	4.00	5.05	244.3	247.3	4	10	2	10
#20	22	11	14	3	37	28	1.60	2.10	85.0	26.0	1	10	0	10

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