THE IMPORTANCE OF THE SEQUENCE OF APPROACH-AVOIDANCE CONFLICT INDUCTION: EFFECTS OF REWARDS, PUNISHMENTS AND DRUGS

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CHAPTER I

THE PROBLEM

Experimental work in the area of conflict which began in the late 1930's has been pursued with interest and ingenuity. Much of this interest is a function, no doubt, of the importance of conflict in the clinical setting. Clinicians, such as Freud, (1909) have long recognized the role which conflicts between values, desires, and goals play in the etiology of psychopathology. These conflicts with their resultant tensions and anxiety have been seen as the basis of the neurotic's misery and the psychotic's "weird" behavior.

A second impetus to the laboratory study of conflict has been provided by Miller and his associates at Yale. Using the terminology and theory developed by Hull (1938) and the postulates developed by Miller (1944) and tested by Brown (1948) a rigorous and simple theoretical framework has emerged which allows for the derivation of testable hypotheses.

With one exception (Miller, 1961), the literature on approach-avoidance conflict reveals that the approach tendency is established prior to the establishment of the avoidance tendency. This temporal sequence is followed more of practical necessity than out of theoretical demands. This difficulty is due to the impracticality of getting an organism to make a response, the consequences of which will be punished, unless there is some approach already present which leads the organism

to respond.

As a result of the sole reliance on this sequence of conflict acquisition it is impossible to generalize with any great assurance to situations in which the approach tendency is the more recently acquired habit. While it is assuredly difficult to visualize how in "real-life" situations a conflict could develop in which the avoidance component is established before the approach, an example may serve to illustrate this possibility. Take the case of a girl, who from childhood is raised to feel that any sexual activity is "dirty" and to be avoided. As she reaches puberty and begins to date, certain pressures from peers, particularly from those boys whom she dates, begin to make themselves felt. Coupled to these social pressures, are those which the girl feels from her desires for intimacy with those boys of whom she is especially fond.

Apart from these general methodological considerations, there are also certain theoretical and practical problems. In Miller's recent work with drugs, the generality of the finding that sodium amytal reduces the avoidance more than the approach component, has been questioned on the grounds that the drug may effect the more recently acquired tendency to a greater degree than the older tendency. Miller (1961) reports evidence that amytal reduces the avoidance more than the approach tendency regardless of whether or not it is the newer tendency. He does not, however, directly compare a group in which the approach is established first with a group in which the avoidance is the older habit. We cannot, therefore, completely rule out the possibility that amytal derives some of its fear-reducing properties from its effect on the newer tendency. There is also the possibility that the ease with which a conflict may be reduced either by increasing the approach or the avoidance until the gradients no longer intersect may be a function of the order in which the

conflict is established. Similar to the above is the possibility that mixing the approach and avoidance training in a somewhat random, intermittent schedule may increase the resistance of the conflict to both drugs and dissolution by increasing one of the components. In order to test these possibilities, three sequences of conflict induction will be utilized. These sequences are:

1) The establishment of a conflict in which approach training is followed by avoidance training.

2) The establishment of a conflict in which avoidance training is followed by approach training.

3) The establishment of a conflict in which approach trials are interspersed with avoidance trials, i.e. an intermittent schedule is followed.

Following this initial training to establish an approach-avoidance conflict, each of the three groups is split in half (3 by 2 factorial). One half of each group receives additional rewarded trials to increment the approach habit while the other half of each group receives additional punished trials to produce an increment in the avoidance tendency.

In the final stage, each of the six subgroups is further divided into three smaller groups (3 by 2 by 3 factorial). These smaller groups are given an intraperitoneal injection of sodium amytal, chlorpromazine, or isotonic saline solution.

To summarize: There are several questions which are posed concerning the effects of various operations on the sequence of the establishment of conflict. They are:

1. Will the three sequences of induced conflict produce differential effects on the operation of subsequent rewards and punishments?

2. Does amytal derive its fear-reducing properties from its effect on the more recently acquired habit?

3. Chlorpromazine has been found to produce diverse effects on approach-avoidance conflicts; will its effects be consistent when different sequences of conflict are utilized?

CHAPTER II

A SELECTIVE REVIEW OF THE LITERATURE

In order to place the present study in historical perspective, the development of the conflict model will be traced with emphasis on the conceptual evolution of the approach. Material from additional areas such as intermittent reinforcement, recency versus primacy, and drugs will be discussed and related to various aspects of the present study. As an outgrowth of this body of experimental literature, certain questions concerning the operation of conflict on behavior will be posed.

Historical Introduction

The notion that an individual can be both attracted and repelled by the same object, though an old one, has only recently acquired a prominent status within the field of scienfitic psychology. Among the earliest noteworthy approaches, Freud (1900) in his Interpretation of Dreams emphasizes the influence of ambivalent feelings in the content of dreams. Further, in his analysis of a phobic reaction in a five-year-old boy (1909), Freud attributed the phobia to the boy's ambivalent feelings toward his father. But, what exactly is the nature of this ambivalence? On the one hand, for Freud personality was a dynamic process consisting of the interaction between driving forces, termed cathexes, and restraining forces termed anticathexes. On the other hand, conflict occurs in the form of opposition between the structures of the personality, i.e. ego, superego,

and id, in their striving to obtain control of libidinal energy. The primary result of this conflict is the arousal of anxiety which the individual attempts to reduce through defense mechanisms. Conflict (ambivalence), therefore, can be defined for Freud as the simultaneous arousal of feelings of fear and pleasure by a single event. Stated in other words, an object is endowed with both cathexis and anti-cathexis.

Another early exponent of conflict was Pavlov (1927), who in his studies of the salivary reflex in dogs was the first to breach the gulf between the clinical formulation of conflict and the scientific methodology of experimental psychology. He discovered that dogs, if repeatedly presented with difficult discrimination tasks, developed persisting neurotic-like behavior (experimental neurosis) as a consequence of the intense conflict. For Pavlov, conflict was viewed as a neurophysiological process which involved the simultaneous arousal of excitation and inhibition in the cerebral cortex.

More recently, Lewin (1931, 1935) divided conflict into types -- approach-approach, avoidance-avoidance, and approach-avoidance. Lewin's approach-avoidance conflict is very similar to Freud's concept of ambivalence. For Lewin, "Conflict is defined psychologically as the opposition of approximately equally strong field forces." (1935; p. 88) As an example of approach-avoidance conflict, he describes a child who "faces something that has simultaneously both a positive and a negative valence." (1935; p. 89) The child's normal reaction to this situation is to leave the field, if no restraining barriers are present. This withdrawal may be either physical or inward, i.e. the child focuses his attention upon something else. This withdrawal is usually only temporary

for the child returns to the task after a while for another try. After a number of repetitions of this activity, the child permanently withdraws from the situation.

While the three foregoing conceptions of conflict are not without current supporters, these conceptions have largely been merged and/or replaced in American experimental psychology with the model developed by Neal Miller and his associates at Yale University. Before detailing Miller's views, some of the weaknesses of these earlier approaches which led to the new formulation will be briefly examined. First, due to possible deleterious effects, psychologists have been understandably reticent to induce severe and meaningful conflict of any appreciable duration in human subjects. As a consequence of this reticence and the greater control afforded by animals, the majority of experimental work has been undertaken using animal subjects.

Relatedly, Freud's concept of ambivalence, while a noteable contribution and still widely used in clinical settings, does not readily lend itself to experimental investigation using animals. Since no one has seriously postulated the existence of an id, ego, and superego in any species other than man, a strict translation of the Freudian conception of conflict has not been possible for work performed with subhuman subjects.

In relation to Pavlov, his concept of experimental neurosis has been widely investigated with dogs, sheep, rats, cats, and other animals. These studies, while generally successful in the production of neurotic symptoms, have failed to shed light on the parameters of conflict itself. In addition, the response measures he employed were frequently subjective rather than quantitative. This latter criticism is inherent

in Pavlov's definition of conflict as the simultaneous arousal of cortical excitation and inhibition. As with Freud, this definition would require that the experimenter somehow be able to "get into the organism" in order to measure the conflicting elements.

Finally, Lewin's conception, although stimulating little research itself, is the direct forerunner of the contemporary conflict model. His conception, however, is not well integrated into a theory of behavior nor is it explicitly stated in terms of behavior. In contrast, the definition of approach-avoidance conflict in terms of behavioral tendencies is one of the primary advantages to Miller's conceptualization.

Current Status

Antedating Miller's statement, Hull (1938) translated Lewin's conceptualization in terms of the goal gradient and deduced some principles which determine the relative strengths of competing responses (conflict). Building on this base, Miller (1944) gave a thorough review and a theoretical account of the conflict notion. In this account he states the following four fundamental principles for understanding the ". . . . conflicts between tendencies to approach and to avoid:"

1. The tendency to approach a goal is stronger the nearer the subject is to it. This will be called the approach gradient.

2. The tendency to go away from a place or object avoided is stronger the nearer the subject is to it. This will be called the avoidance gradient.

3. The strength of avoidance increases more rapidly with nearness than does that of approach. In other words, it may be said that the avoidance gradient is steeper than the approach gradient.

> 4. The strength of the tendencies to approach or avoid varies with the strength of the drive upon which they are based. Thus, an increased drive may be said to raise the <u>height</u> of the entire gradient.
>
> (1944, p. 434)

Miller's refinement of the language, together with his elaboration of principles, enables one to make testable predictions in various conflict situations. This refinement and expansion is basically in agreement with Lewin's formulation. Miller, however, asserts that no barriers will be needed to hold the subject in the conflict situation as the approach tendency will bring him into it. Thus, "as long as the gradients cross, the subject should remain trapped part-way to the goal, unable to either achieve or leave it." (1944, p. 451) This deduction can be derived through the above principles one, two, and three.

In a still more recent comprehensive statement of conflict, Miller (1959) discusses his original approach and shows how this research has proceeded to the present. The adequacy of his earlier formulation is attested to by the fact that his original assumptions and deductions have withstood the test of experimental investigation.

Since the development of Miller's conflict model was based on empirical research and since the model itself has generated further research, attention will now be focused on the methodology commonly employed in the investigation of approach-avoidance conflicts. In the typical conflict experiment, hungry rats are run down a straight alley and given food reward in the goal box until a certain criterion is reached, i.e. a set number of trials or a stable running speed. Following this approach training, the goal box is electrified and the rats receive an electric shock for entering, thus establishing the

avoidance component of the conflict. This procedure is continued either until the animal no longer enters the goal box or his latency has become quite lengthy.

To recapitulate, the sequence is such that approach training precedes avoidance training and the subject is on a continuous schedule of reinforcement. As previously discussed in Chapter I, the generality of the conflict findings are severely limited by the complete reliance upon this sole sequence of conflict induction. As this study is primarily concerned with whether or not the utilization of different conflict induction sequences leads to different reactions with regard to the subsequent effects of rewards, punishments, and drugs on running speed; it would be helpful to be able to refer to a body of literature in which different conflict induction sequences have been used. Unfortunately, as we have seen, Miller's conflict model relies upon only one temporal sequence of approach and avoidance training in the induction of conflict. Consequently, predictions as to the comparability of different induction sequences will have to wait until literature from other areas has been examined.

Intermittent Reinforcement

One body of literature directly related to the question of differential conflict induction is concerned with the scheduling of reinforcements. As has been mentioned above, in the typical approach-avoidance experiment rats are given their approach training and are then given their avoidance training. That is, the subject is on a continuous reinforcement schedule. Research by Skinner and his associates (Ferster and Skinner, 1957) has demonstrated the superiority of intermittent over continuous

reinforcement in maintaining behavior when extinction trials are given. Although the author does not know of any such study, this suggests that a group given conflict acquisition training in which rewards are interspersed with punishments should be more resistant to the response-inhibiting effects of subsequent punishment than groups trained under continuous approach and avoidance. As Lawson (1960) has pointed out, the findings with intermittent reinforcement have been obtained primarily in free responding situations (operant conditioning boxes), rather than in more controlled situations like straight alleys. The principle findings should be the same, however.

Recency

Another body of research literature which should provide some insight into possible differences between conflict induction sequences is concerned with the effects of recency, primacy, and frequency of reinforcement. Overall and Brown (1957) in their theoretical review of the roles of recency and frequency in response prediction report that there is considerable controversy as to whether organisms utilize all of their past experience in a situation or only their most recent experience. Voeks (1948) found that responses could be predicted more accurately by utilizing a recency (postremity) notion than if predictions were based solely on the frequency of the response. This greater accuracy of postremity-based predictions held even when frequency and postremity notions led to opposite predictions.

Voeks (1948) prefers to speak of the principle as postremity rather than recency because it refers to the last response in a succession

of responses rather than to "recency" in time. This is very similar to Guthrie (1959) who contends that stimulus and response become associated after a single occurrence. Guthrie's position is one which clearly emphasizes a recency notion. Spence (1956) and Hull (1951), on the other hand, would favor response prediction on the basis of frequency of response followed by reinforcement. Overall and Brown (1957) in a series of experiments report that recency is a more accurate predictor of responses than is frequency, but that prediction is most accurate using a weighted formula which takes both recency and frequency into account.

Drugs and Conflict

The literature reviewed to this point has been presented because of its relevance to the problem of differentially induced approach-avoidance conflicts. This study is primarily concerned with the effects of using different sequences of reward and punishment in the establishment of the conflicting approach and avoidance tendencies. The equivalency of these differentially induced conflicts will be evaluated through the addition of rewards, punishments, and two drugs; chlorpromazine and sodium amytal. Consequently, a brief review of the literature concerned with the effects of these two drugs on approach-avoidance conflicts will be presented. It should be emphasized, at this point, that these studies are concerned with the effects of the drugs on the traditional sequence of conflict induction -- that is, approach training followed by avoidance training.

Recently, Miller and his associates, e.g. Bailey and Miller (1952), Miller and Barry (1960), Miller (1961), Barry and Miller (1962), Grossman (1961), Barry, Wagner, and Miller (1963), and Barry, Miller, and Tidd (1962)

have found that the administration of sodium amytal reduced the rate (speed) of responding under approach conditions and increased the rate (speed) of responding when the threat of punishment (avoidance) was present. The conclusion reached is that the drug reduces both the tendency to approach and the tendency to avoid, but that it reduces the tendency to avoid more than the approach tendency. Hence, in a conflict situation, performance is improved following administration of the drug. The work with chlorpromazine, however, has produced less consistent results. Miller (1961), Grossman (1961) and Barry, Wagner, and Miller (1963) have obtained evidence for the avoidance reducing effects of chlorpromazine. Whereas, Masserman (1960), Barry and Miller (1963), and Geller and Seifter (1960) have resported little or no avoidance reduction using chlorpromazine.

Summary

The development of the conflict model has been traced with some emphasis on the manner in which approach-avoidance conflict has been defined. Recent findings with two drugs -- amytal and chlorpromazine -- have been summarized. The sole reliance on a single conflict induction sequence has been pointed out, along with the possibility that different induction sequences may not produce equivalent conflicts with regards to the effects of the addition of rewards, punishments, and drugs. Consequently, attention was focused on schedules of reinforcement and recency-primacy effects in the hope that literature from these areas might serve as sources from which predictions could be derived concerning the differences which may be produced as a function of differential

conflict induction.

Purpose of Study

Three general questions will be examined through the utilization of three sequences (i.e. different orders of rewards and punishment) of conflict induction. These are:

1. Will the three sequences of induced conflict produce differential effects on the operation of subsequent rewards and punishments?
2. Does amytal derive its fear-reducing properties from its effect on the more recently acquired habit?
3. Chlorpromazine has been found to produce diverse effects on approach-avoidance conflicts; will its effects be consistent when different sequences of conflict induction are utilized?

In addition to these general questions, several specific hypotheses will be tested. These hypotheses will be discussed following the presentation of the experimental procedure employed.

CHAPTER III

METHOD

General Design

The training was divided into three phases. During phase I, three groups of rats were given conflict acquisition training -- group I received approach training followed by avoidance training, group II received the reverse, and group III received the approach and avoidance training in a random, interspersed manner. Following this initial experience, animals in each of the three groups were divided into two subgroups for the second phase of training. During phase II, one subgroup in each condition received additional rewarded trials, the other received the same number of punished trials. In the third phase of training, each of the six groups was divided into three subgroups. These final groups were given intraperitoneal injections of chlorpromazine, sodium amytal, or isotonic saline solution, and were continued under either rewarded or punished trials.

Apparatus

A straight alley six feet long, six inches wide, and four inches deep was used. The alley was painted a flat gray. The start box was twelve inches long; the goal box was eight and one-half inches long and was separated from the rest of the alley by a guillotine door, operated by the experimenter. The floor of the goal box was covered by a grid

made of brass rods. The rods were one-eighth inch in diameter and were one-half inch apart. The food cup mounted to the end panel was round in shape, measuring 3/16 inch deep, two and 3/16 inches wide at the top and two inches wide at the bottom. It was one and 3/4 inches above the floor in the rear and one and 1/4 inches high in the front. The alley was covered with a wire-mesh top. A door eight and 1/2 inches long over the start box allowed the animals to be inserted; a door nine inches long over the goal allowed the experimenter to remove the animals. The end panel in the start box was equipped with a handle, five feet long. The panel could be shoved down the alley forcing the animal to enter the goal box.

Photo cells were located at points 12 inches from the start of the alley and eight and 1/2 inches from the end of the alley. The photo cells were connected to standard electric timers. One timer was calibrated in seconds to the nearest 1/100 of a second, the other in minutes to the nearest 1/1000 of a minute. The subject activated the clocks when it left the start box; the clocks stopped when the subject entered the goal box. In this box alternate bars of the grid were wired together and connected to a Hunter shock apparatus. The apparatus delivered a 1.45 m.a. shock for one second. The experimenter operated a switch which activated the shock apparatus when subjects entered the goal box on shock trials. A 15 watt, white light bulb, suspended five and 1/2 feet above the alley, served to illuminate the room. There was also a shielded lamp on the recorder's table. The clocks, photocells, alley and shock apparatus were mounted on a table in a windowless experimental room. The subjects were housed in the room.

Subjects, Deprivation Schedule, and Reinforcement

The subjects were 36 male albino Sprague-Dawley rats from the Holtzman Company, Madison, Wisconsin. They were housed in individual living cages with free access to water. Subjects were placed on 24 hr. deprivation a week before the beginning of training. During this pre-training period, food was removed from the cages except for one hour a day. The subjects were handled daily during this period.

The reward consisted of two 45 mg. food pellets from the P.J. Noyes Company, Lancaster, New Hampshire. The punishment consisted of a one second, 1.45 m.a. shock.

During the experiment, animals were fed for 45 minutes, immediately following their last trials for the day. At the beginning of each day's training they were approximately 22 hours deprived.

Procedure

In the first phase of training, subjects were randomly assigned to one of three training groups (Table I). Group I received the traditional conflict training sequence -- 48 trials of rewarded approach training followed by 16 trials of punished avoidance training. Group II animals received the reverse -- 16 trials of punishment followed by 48 trials of reward. Group III received the 48 rewarded trials and the 16 punished trials in a random, interspersed manner such that on all days they were given three rewarded trials and one punished trial. The punishment was given on each trial within the block of four trials an equal number of times. In this, as in all phases of training, four trials were given each day to all animals.

TABLE I

TRAINING SEQUENCE

Group	Phase I	Phase II	Phase III
Group I	48 trials reward then 16 trials punishment	A. 20 trials reward	1. sodium amytal 2. chlorpromazine 3. saline
		B. 20 trials punishment	1. sodium amytal 2. chlorpromazine 3. saline
Group II	16 trials punishment then 48 trials reward		
Group III	64 mixed trials (48 rewards 16 punishments)		

In order to insure that animals would enter the goal box during avoidance training, all animals were forced if they had not entered the goal box within 100 seconds of being placed in the start end. Forcing was accomplished by extending the false, moveable end of the start box into the alley to the goal box.

In phase II, following initial conflict-acquisition training, animals in each of the three groups were divided into two matched sub-groups of six animals each. Matching was on the basis of speed during the last day's training in phase I. One subgroup in each condition received twenty additional rewarded trials, the other received the same number of punished trials. (Table I)

In the final phase of training, each of the six subgroups was divided into three matched sub-groups of two rats each. These final groups were given chlorpromazine, sodium amytal, or isotonic saline solution (Table I). All were administered by intraperitoneal injection. The dosage level of chlorpromazine was four mg. per kilogram of body weight. The level for amytal was 20 mg. per kilogram of body weight. The drugs were injected in a solution of isotonic saline. The volume of the solution injected was 1.5 ml. per kilogram of body weight. All solutions were injected with 1 cc. tuberculin syringes, calibrated to 1/100 of a cc. The syringes were equipped with 22 guage, one inch needles. A different syringe and needles were used for each of the three drug conditions. A total of four trials was given under these conditions, and each group continued under the reward or punishment schedule in effect during phase II. All animals were forced if they had not entered the goal box within 150 seconds of being placed in the start end.

Hypotheses

An attempt will now be made to formulate and integrate predictions concerning the differences between the various treatment groups. During phase II when additional rewards and punishments are being given, the following predictions were made:

1. Rewarded animals will be faster than punished animals.
2. For those animals receiving reward, group II (avoidance-approach) will be faster than will group I (approach-avoidance) or group III (mixed).
3. For those animals receiving punishment, group I (approach-avoidance) will be the slowest and group III (mixed) will be the fastest.
4. Irrespective of reinforcement, group I (approach-avoidance) will be the slowest and group III (mixed) the fastest.

During phase III when the drugs are introduced and animals are continued on the schedule of rewards and punishments, these predictions were made:

1-4. The same predictions are made as above.

5. Amytal-injected rats will be faster than those given chlorpromazine or saline solution.
6. Under the reward condition amytal will decrease running speed.
7. Under the punishment condition amytal will increase running speed.

It will be noted that specific predictions are not made concerning the effects of chlorpromazine nor are there predictions concerning the effects of either drug as a function of the conflict induction sequences.

Now that the hypotheses which are to be investigated have been stated, the rationale underlying the specific predictions will be briefly examined. The first four hypotheses for phases II and III are identical. These four hypotheses are concerned with the effects of additional rewards

and punishments following differentially induced approach-avoidance conflicts.

The first hypothesis, which predicts that rewarded animals will achieve the goal with shorter latencies than will punished animals, has received such extensive empirical support that it can be considered a behavioral law. The second and third hypotheses were derived in the following manner: In the present study, frequency of reward and punishment is equivalent for the three conflict acquisition groups. Since frequency is not a differential variable, the predictions are handled on the basis of recency and intermittency of reinforcement. Consequently, the group in which approach is the more recently established tendency (group II) should perform better than the group in which avoidance is the newer tendency (group I). This is to be expected under both reward and punishment. On the basis of this and the previously discussed effects of intermittent reinforcement, it is to be expected, in regards to punishment, that group I (approach followed by avoidance training) will perform the poorest and group III (mixed) the best. In regards to the rewarded animals, it is predicted that group II (avoidance-approach) will be superior to both group I (approach-avoidance) and to group III (mixed). The expectation that group II will be faster than group III (under reward) is based upon the fact that group II's last 48 trials during phase I were under a schedule of continuous reinforcement. Although an intermittent schedule leads to greater resistence to extinction, it is not expected to produce as vigorous responding in the presence of reinforcement as does a continuous schedule. No prediction can be made, however, concerning the relative positions of groups I and III.

The fourth hypothesis represents an extension of the thinking underlying the second and third hypotheses. The extension rests upon the assumption that the absolute differences among the three groups will be greater under punishment than under reward. Under reward, it is expected that the animals will perform near asymptotic level. Under punishment, however, it is predicted that the latencies will become much greater and that the absolute differences among groups will become larger. Since it is predicted that group III (mixed) will be the fastest among the punished groups, it is also predicted that group III will be the fastest cutting across reinforcement conditions. As group I (approach-avoidance) is predicted to be the slowest under both reward and punishment, it logically follows that it will be the slowest cutting across reinforcement conditions.

From the many possible comparisons that could be made following the introduction of the drugs, only three specific predictions have been stated (hypotheses 5, 6, and 7). These predictions have previously received empirical support; this evidence has been summarized in Chapter II.

CHAPTER IV

RESULTS

General Statement

Since four trials were given each day throughout the experiment, the median time for each day was computed for the purpose of statistical analyses. Consequently, all analyses are based upon these scores. Two general categories of analyses will be presented. First, are several preliminary analyses which serve to substantiate the expectation that reward and punishment produce certain effects. The remaining analyses consist either of those crucial to the testing of the main hypotheses or which were unexpected.

Preliminary Analyses

These analyses are based upon data obtained in the first phase of the study. This phase occupies the first 16 days and is the period during which the approach-avoidance conflicts are being differentially induced. Three analyses were performed here.

An initial analysis of variance was performed on the data for the first four days of training (Table II), and was designed to evaluate the relatively pure effects of reward/punishment on performance. It will be recalled that during this period, group I (approach-avoidance) received continuous reward, group II (avoidance-approach) received continuous

TABLE II

AOV OF FIRST FOUR DAY'S TRAINING — PHASE I

Source	SS	df	MS	F	P
Sequence	140030.47	2	70015.24	36.63	.001
Reinforcement*	905.11	1	905.11	.47	
Seq. X Rein.*	111.58	2	55.79	.03	
Error (bet)	57342.46	30	1911.42	---	
Trials	2432.73	3	810.91	1.58	
Tr. X Seq.	4759.30	6	793.22	1.55	
Tr. X Rein.*	727.95	3	242.65	.57	
Tr. X Seq. X Rein.*	3267.05	6	544.51	1.06	
Error (with)	46100.51	90	512.23	---	
Between Subjects	198389.62	35			
Within Subjects	57287.54	108			
Total	255677.16	143			

* Refers to groupings in effect during phase II. Demonstrates that the divisions of the three major groups into Reward/Punishments were not different during this part of phase I training.

punishment, and group III (mixed) received intermittent rewards and punishments. This analysis yielded the expected results. That is, group I was the fastest and group II was the slowest ($<.001$) with the mixed group (Figure I) performing at an intermediate level. Neither the trials effect nor the trials by sequence interaction approached significance.

A similar analysis was performed over the last four days of training (Table III). During this period group I (approach-avoidance) was now being punished and group II (avoidance-approach) was being rewarded. Group III (mixed) remained under the intermittent schedule of reward and punishment. This analysis (Figure II) revealed that group I was slower than the other two groups at less than the .001 level of significance. Once again, neither trials nor trials by sequence was significant. This analysis is of importance in that it provides a means of comparing the equivalency of the conflicts produced by the three induction sequences. While the major concern is with the effects of subsequent operations on the stability of the conflicts, it is essential to know their relative intensities prior to these operations.

One final preliminary analysis was performed over the punishment trials for groups I and II (Table IV). That is, the first four days of training for group II (avoidance-approach), which received its initial experience with punishment, were compared with the last four days of training for group I (approach-avoidance) which received its punishment experience subsequent to approach training. Group I was found to be faster than group II at less than the .001 level of significance (Figure III). This analysis reveals that punishment following rewarded trials retards running speed significantly less than punishment administered without any previous exposure to the situation.

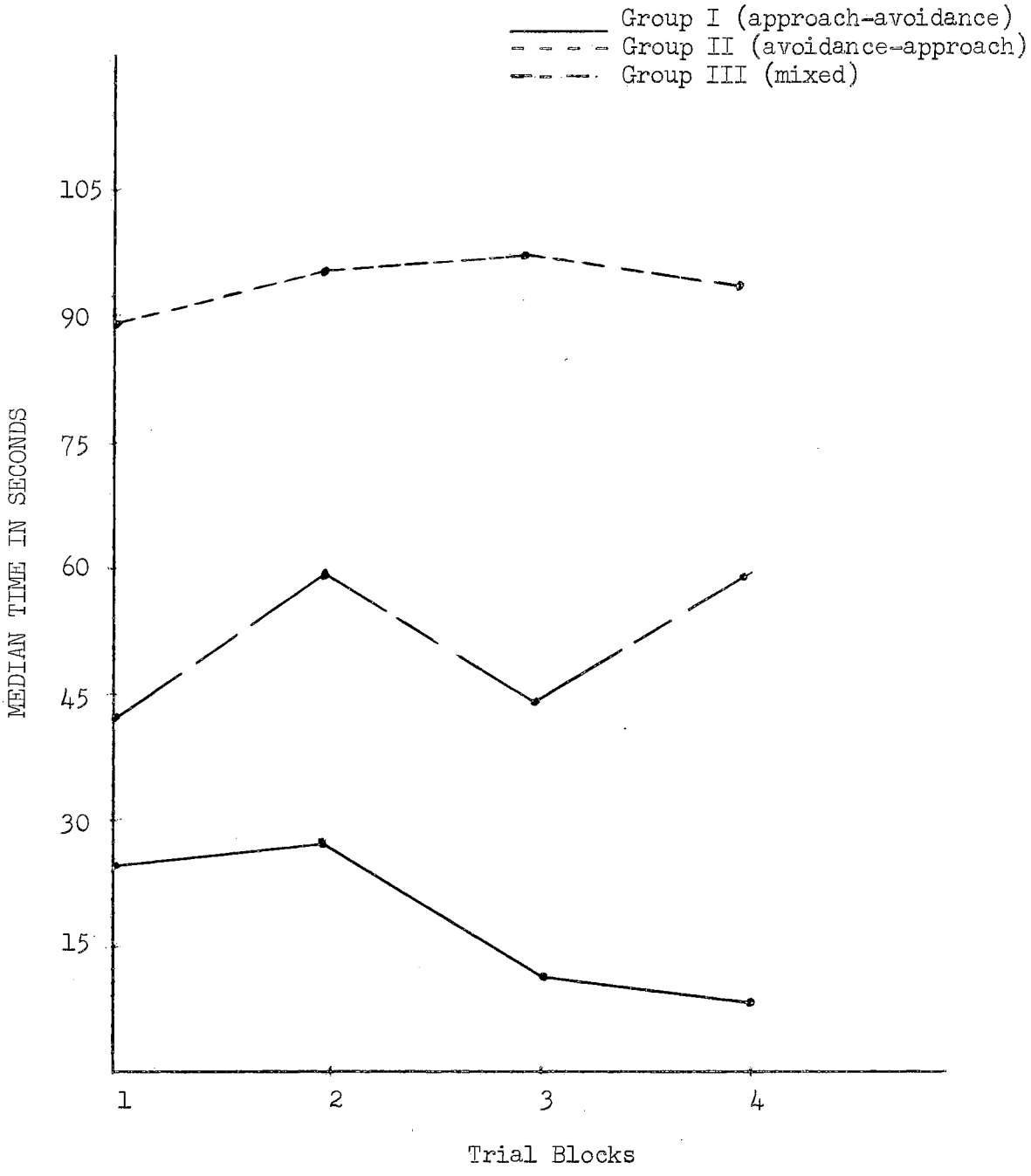

Figure I

First 16 Trials
Phase I

TABLE III

AOV LAST FOUR DAY'S TRAINING -- PHASE I

Source	SS	df	MS	F	P
Sequence	28466.33	2	14233.16	11.92	.001
Reinforcement*	6.61	1	6.61	.00	
Seq. X Rein.*	13.21	2	6.60	.00	
Error (bet)	35807.23	30	1193.57	---	
Trials	1285.57	3	428.52	1.94	
Tr. X Seq.	2287.13	6	381.19	1.73	
Tr. X. Rein.*	374.29	3	124.76	.57	
Tr. X. Seq. X Rein.*	664.63	6	110.77	.50	
Error (with)	19835.45	90	220.39	---	
Between Subjects	64293.38	35			
Within Subjects	24447.07	108			
Total	88740.45	143			

* Refers to groupings in effect during phase II. It demonstrates that the divisions of the three major groups into reward/punishment were not different during this part of phase II training.

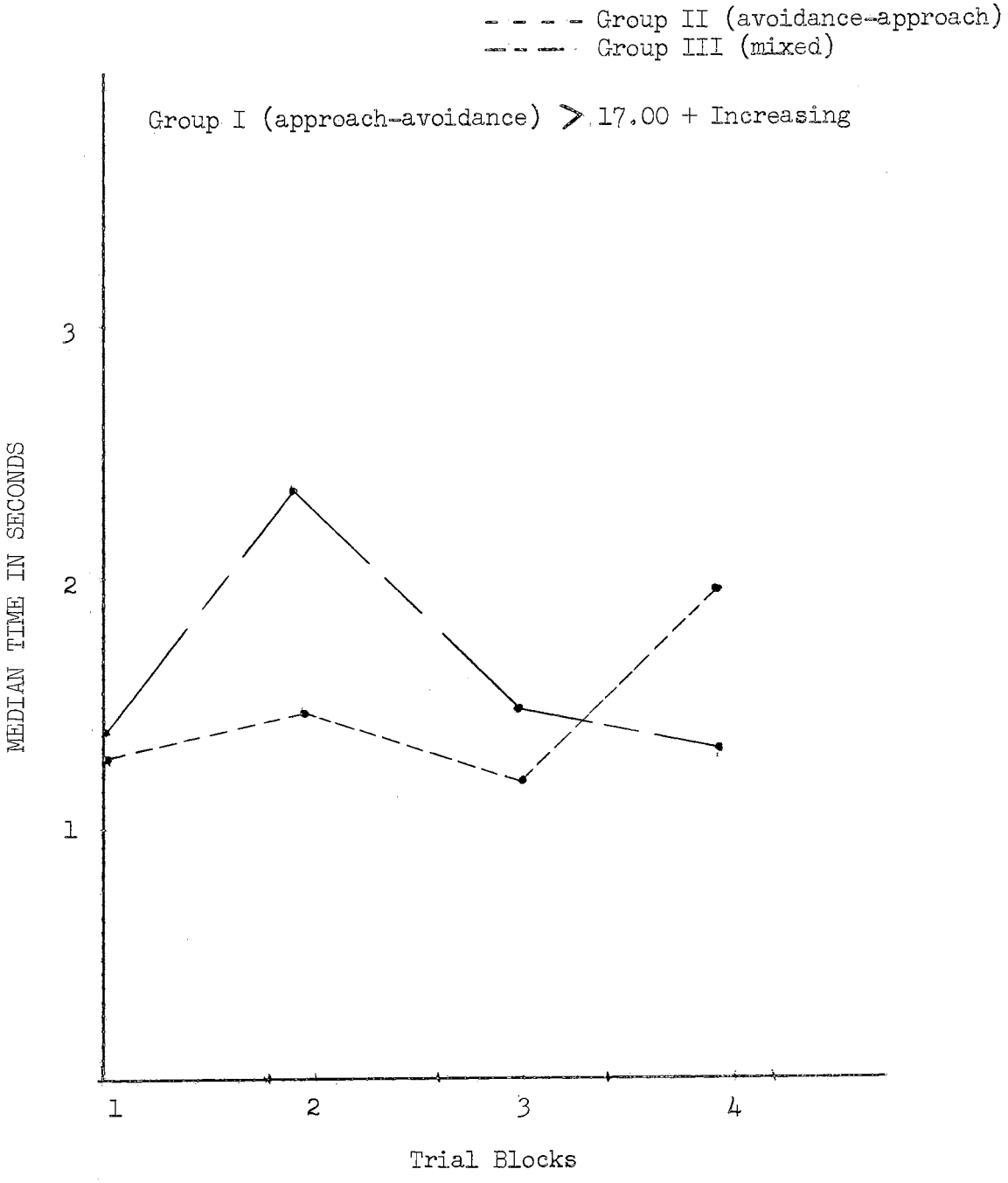

Figure II

Last 16 Trials
Phase I

TABLE IV

AOV ON PUNISHMENT TRIALS FOR GROUPS I AND II -- PHASE I

Source	SS	df	MS	F	P
Sequence	93333.57	1	93333.59	28.45	.001
Error (bet)	72181.75	22	3280.99	---	
Trials	2749.21	3	916.40	2.30	.07
Tr. X Seq.	1156.13	3	385.38	.97	
Error (with)	26251.86	66	397.76	---	
Between Subjects	135358.14	23			
Within Subjects	30157.20	72			
Total	165515.34	95			

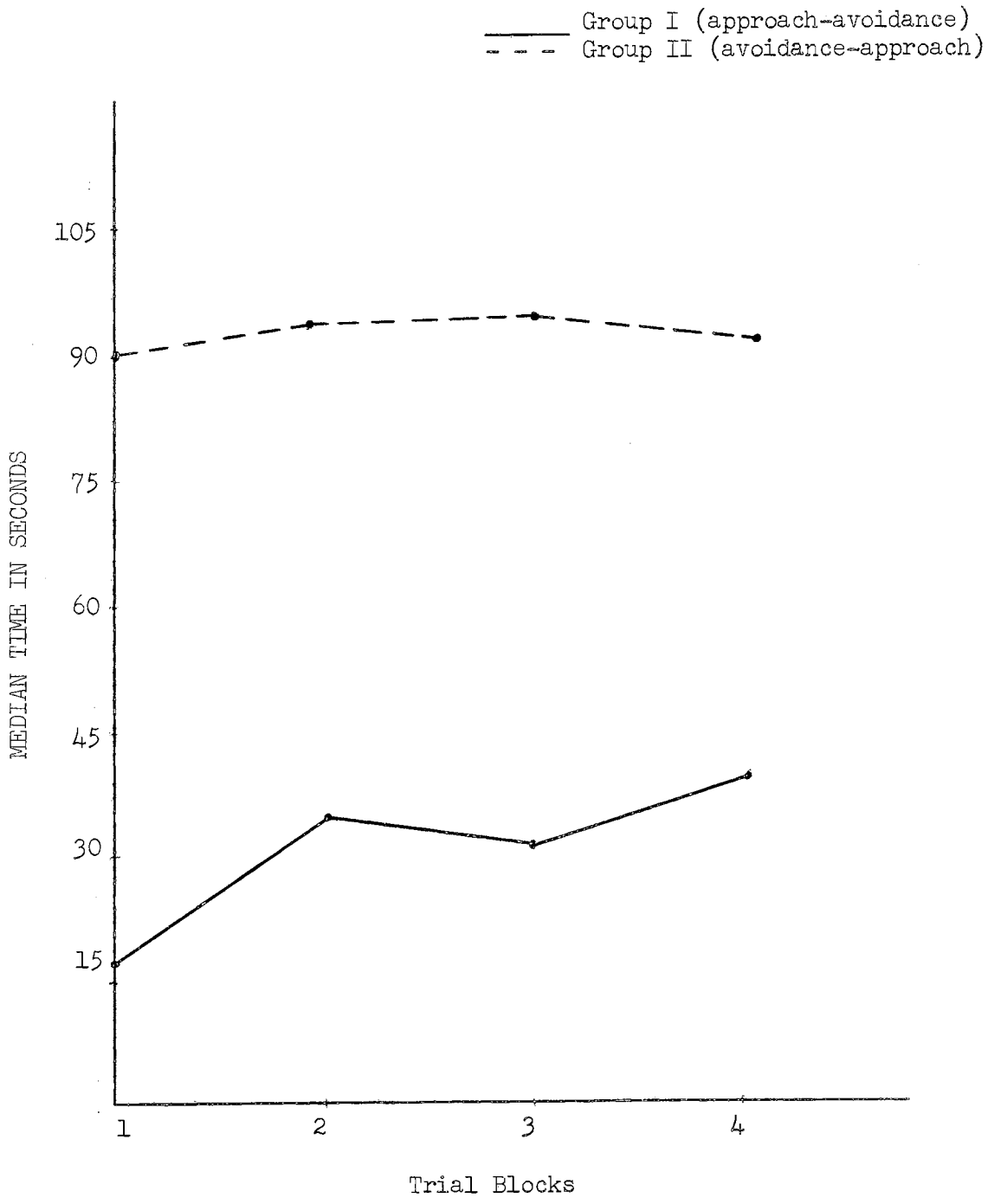

Figure III

16 Punishment Trials
Groups I and II
Phase I

To sum up, the results for phase I are generally in line with common sense expectations. It has been shown that when naive animals are placed in a straight alley, those receiving reward in the goal box will on subsequent trials enter the goal box with a shorter latency than will animals who receive a mixture of rewards and punishments; these animals will, in turn, achieve the goal in less time than will animals who receive only punishment in the goal box. It has likewise been demonstrated that animals who receive their reward training initially show longer latencies at the conclusion of conflict induction training than do animals who receive the mixed training throughout or who receive the punishment training initially. If one considers only those trials on which punishment occurs, however, those animals that receive the punishment initially show longer latencies than do those that receive the reward training initially.

Main Analyses

A. Unexpected findings: An analysis was conducted on the rewarded trials for all three groups (Table V). That is, the first twelve days for group I (approach-avoidance) and the last twelve days for group II (avoidance-approach) were compared. Since group III (mixed) was on an intermittent schedule, it presented more of a problem. In order to make the numbers of trials equal to the other two groups, twelve days were selected so as to evenly encompass the sixteen days of training (days 4, 7, 10, and 13 were eliminated.) The two main effects (trials, sequences) and the trials by sequence interaction were all significant at less than the .001 level of probability. For the three sequences, group II

TABLE V

AOV ON REWARDED TRIALS -- PHASE I

Source	SS	df	MS	F	P
Sequence	14087.43	2	7043.72	12.78	.001
Reinforcement*	68.63	1	68.63	.12	
Seq. X Rein.*	83.68	2	41.84	.08	
Error (bet)	16534.73	30	551.16	---	
Trials	51427.18	11	4675.20	20.17	.001
Tr. X. Seq.	27177.98	22	1235.36	5.33	.001
Tr. X Rein.*	1666.91	11	151.54	.65	
Tr. X Seq. X Rein.*	2663.31	22	121.06	.52	
Error (with)	76488.75	330	231.78	---	
Between Subjects	30774.47	35			
Within Subjects	159424.13	396			
Total	190198.60	431			

* Refers to groupings in effect during phase II. It demonstrates that the divisions of the three major groups into Reward/Punishment were not different during this part of phase II training.

(avoidance-approach) which was punished initially ran the fastest, and group III (mixed) was the slowest. Furthermore, with increasing experience (trials) the animals' speed increased. Finally, for the first six days of reward the three sequences differed highly reliably from one another; however, their performance converged on the last six days, producing a significant interaction (Figure IV). This analysis is particularly important as it enables one to determine the effects of continuous reward versus an intermittent schedule (three rewards to each punishment) and the effects of giving reward in a novel situation versus giving reward in a situation previously paired with punishment on the establishment of an approach habit.

Since the finding that reward following punishment was more effective than reward alone was unexpected, an additional analysis was done covering days five through twelve for groups I and II (Table VI). During this period of the training sequences, both groups were being rewarded, but the amoung of previous experience is constant for the two groups. The nature of this preceding experience covering four days was different, however, since group I was being rewarded and group II was being punished. As in the foregoing analysis, both main effects (sequences, trials) and the interaction are significant beyond the .001 level of probability. In this analysis, however, group I (approach-avoidance) is faster than group II. Once again, the animals' speed increases with increasing trials. The significant interaction is a function of the large difference between the two groups on days five and six; on the remaining days, the two groups converge until they are exactly equivalent on day twelve (Figure V).

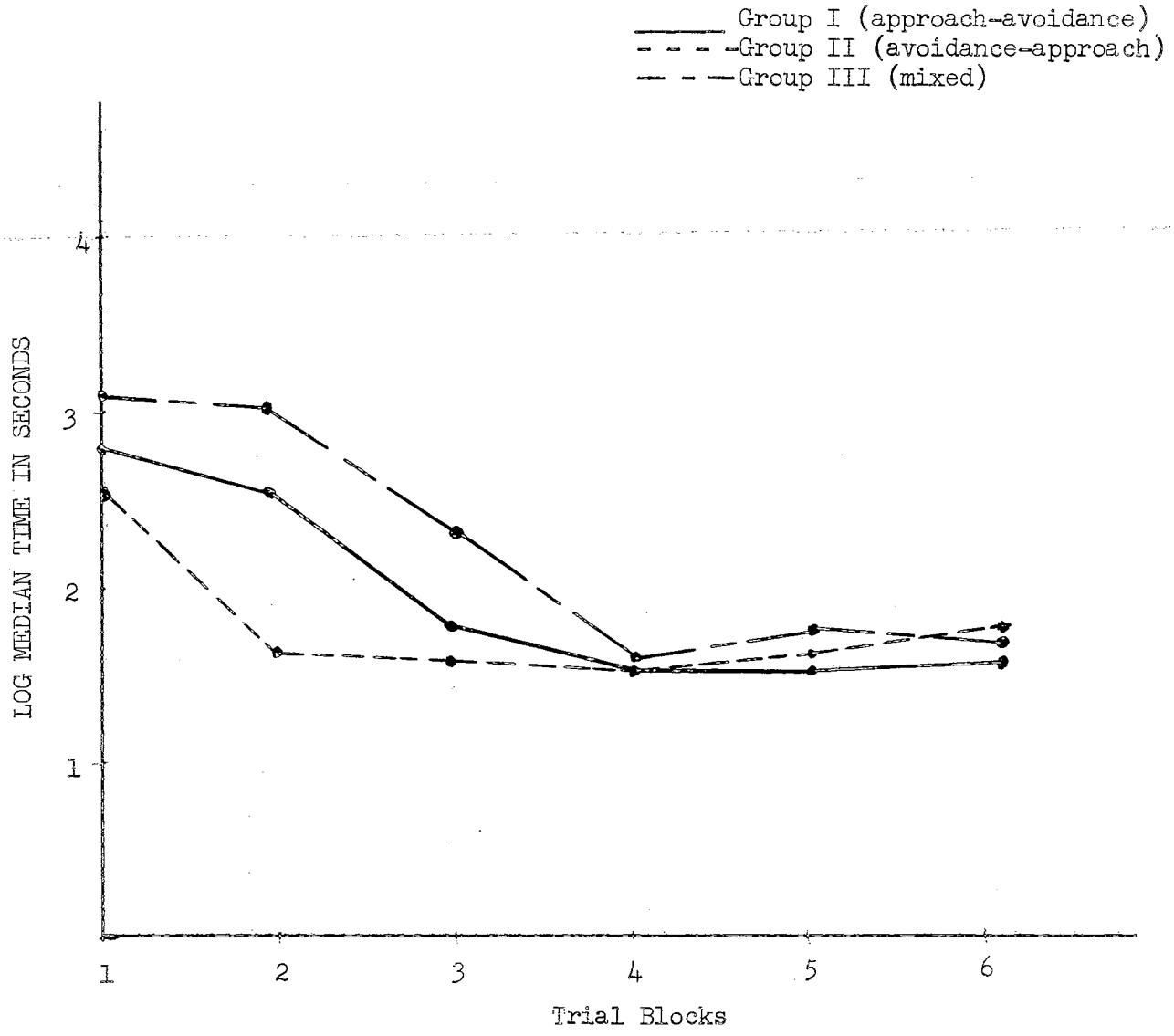

Figure IV

48 Rewarded Trials - Phase I
Score Converted to Logarithms for Purposes of Illustration

TABLE VI

AOV ON EIGHT COMMON DAYS OF REWARD, GROUPS I AND II -- PHASE I

Source	SS	df	MS	F	P
Sequence	509.22	1	509.22	16.51	.001
Error (bet)	678.54	22	30.84	---	
Trials	3089.59	7	441.37	26.81	.001
Tr. X. Seq.	2269.27	7	324.18	19.70	.001
Error (with)	2534.36	154	16.46	---	
Between Subjects	1187.76	23			
Within Subjects	7893.22	168			
Total	9080.98	191			

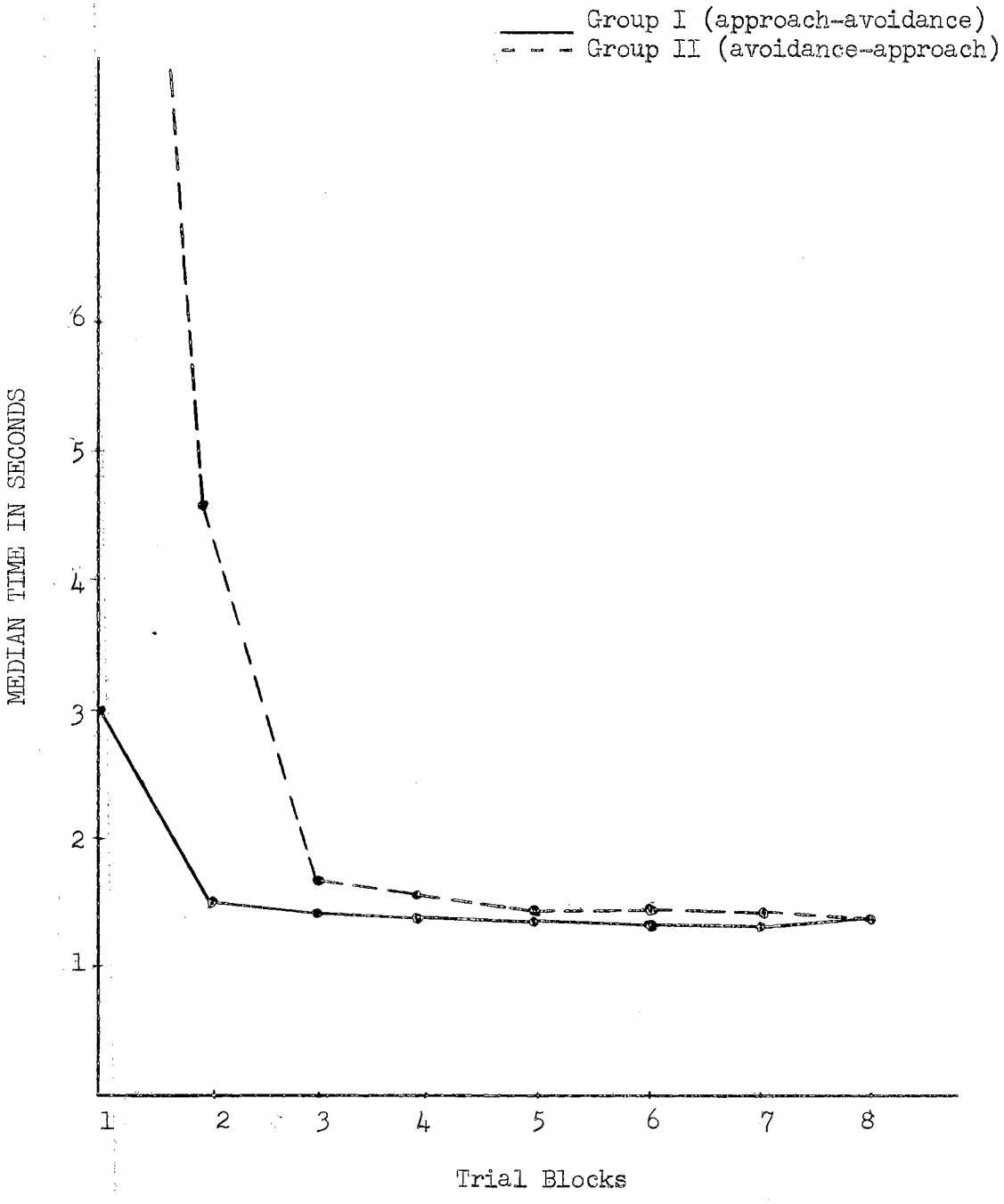

Figure V

32 Comparable Reward Trials
Phase I

B. Phase II: Rewards and Punishments: An analysis of variance was performed over the five days of additional rewards/punishments which constituted the second phase of the study. This analysis yielded some striking and complex findings (Table VII). First, the original training sequences produced an effect significant at less than the .05 level; group III (mixed) animals ran the fastest and group I (approach-avoidance) the slowest. Second, as would be expected, rewarded animals ran significantly ($< .001$) faster than did punished animals. Third, the sequence by reinforcement interaction was significant at less than the .05 level. This indicated that animals trained in the three conflict induction sequences did not differ in their response to additional rewards; punishment, however, reflected the difference in the induction sequences -- group I (approach-avoidance) animals ran the slowest and group III animals (mixed) ran the fastest. Fourth, speed decreased over trials at less than the .001 level of significance. Fifth, the trials by sequence interaction was significant at less than the .01 level. On the early trials the sequences differed highly reliably from one another; on later trials they converged. Sixth, the trials by reinforcement interaction emerged at less than the .001 level of significance. That is, rewarded animals ran faster with increasing trials, and punished animals ran more slowly with increasing trials. Seventh, the third-order interaction, trials by sequence by reinforcement, was significant at less than the .01 level. This was partially a function of group III (mixed) punished rats; during the first four days of additional punishments, they ran faster than did punished rats trained in the other two induction sequences. On the fifth and final day of this experience their running speed was similar to animals in the other two punishment groups (Figure VI). Group I (approach-avoidance)

TABLE VII

AOV OF ADDITIONAL REWARDS/PUNISHMENTS — PHASE II

Source	SS	df	MS	F	P
Sequence	10684.73	2	5342.36	3.68	.05
Reinforcement	80545.13	1	80545.13	55.54	.001
Seq. X Rein.	10359.19	2	5179.60	3.57	.05
Error (bet)	43507.08	30	1450.24	—	
Trials	39653.22	4	9913.30	26.57	.001
Tr. X. Seq.	8500.37	8	1062.55	2.85	.01
Tr. X Rein.	40595.27	4	10148.82	27.20	.001
Tr. X. Seq. X. Rein.	8552.51	8	1069.06	2.86	.01
Error (with)	44779.73	120	373.16	—	
Between Subjects	145096.13	35			
Within Subjects	142081.10	144			
Total	287177.23	179			

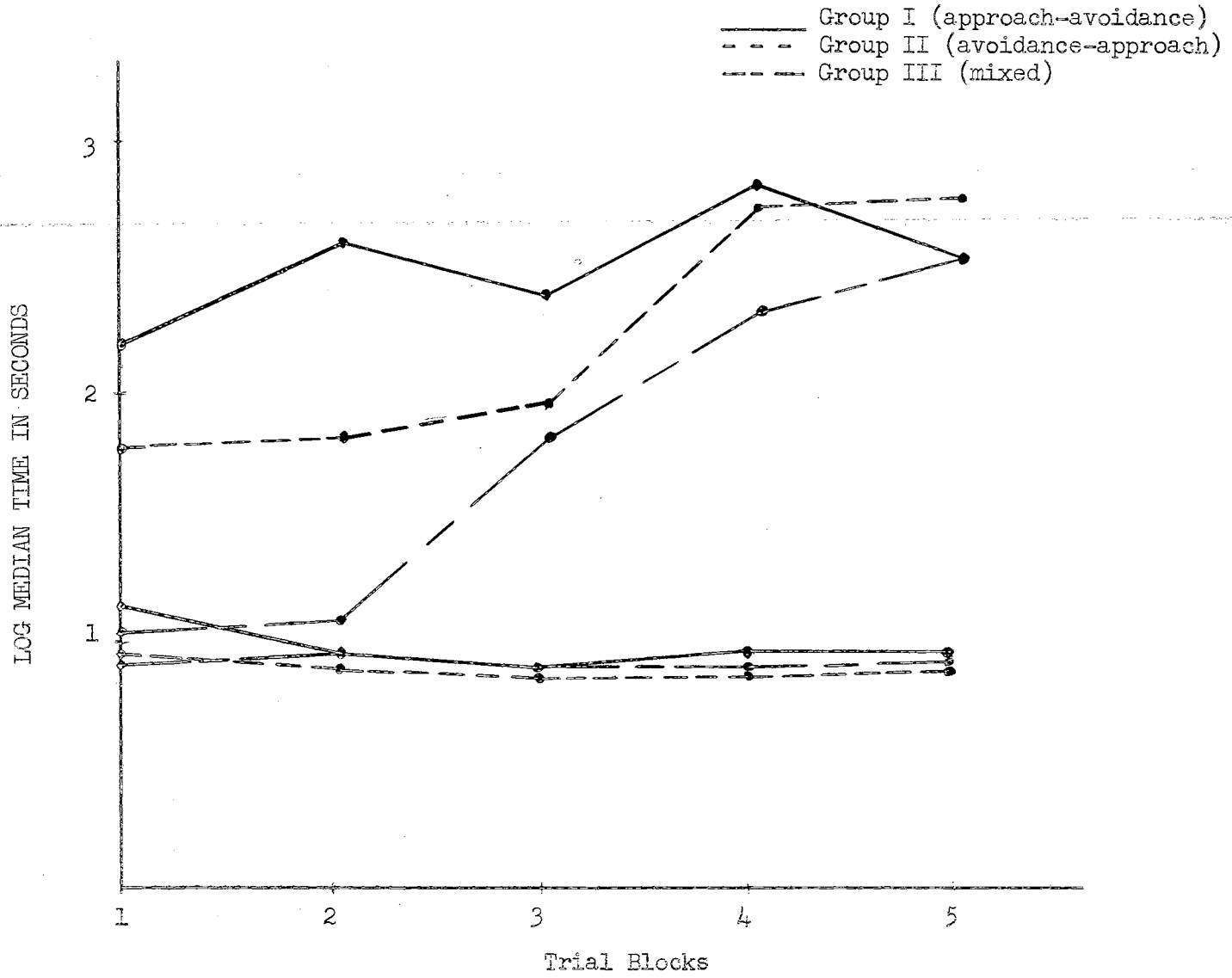

Figure VI

20 Rewards and Punishments - Phase II
Scores Converted to Logarithms for Purposes of Illustration

rewarded animals also contributed to this significant effect. On day one they were slower than animals in the other two training sequences, on the remaining four days, however, all groups were equivalent.

C. Phase III: Drugs: During this final phase of the study, the introduction of drugs provided some complex results. (Table VIII) It was found that amytal produced the fastest running and chlorpromazine the slowest, significant at less than the .001 level. The sequence effect was very similar to that reported in the second phase -- group I (approach-avoidance) animals being the slowest and group III (mixed) the fastest ($<.025$). The reinforcement effect likewise continued with rewarded animals running faster than punished animals at less than the .001 level of significance. The reinforcement by sequence interaction produced an interesting effect, which was significant at less than the .05 level. Under reward, group II (avoidance-approach) was the fastest and group I (approach-avoidance) the slowest, with group III (mixed) occupying an intermediate position. Under punishment, however, group III (mixed) was faster than the other two groups. Finally, the reinforcement by drug interaction was significant at less than the .01 level of probability. Amytal increased running speed under punishment but decreased it under reward; whereas chlorpromazine was the slowest under all sequences (Figures VII and VIII).

TABLE VIII

AOV OF DRUG PHASE -- PHASE III

Source	SS	df	MS	F	P
Sequence	8805.59	2	4402.80	5.54	.025
Reinforcement	38638.45	1	38638.45	48.60	.001
Drug	19470.28	2	9735.14	12.24	.001
Seq. X. Rein.	6444.10	2	3222.05	4.05	.05
Seq. X Drug	5085.62	4	1271.40	1.60	
Rein. X Drug	10674.40	2	5337.20	6.71	.01
Seq. X Rein. X Drug	3453.38	4	863.35	1.09	
Error	14311.94	18	795.11	---	
Total	106883.76	35			

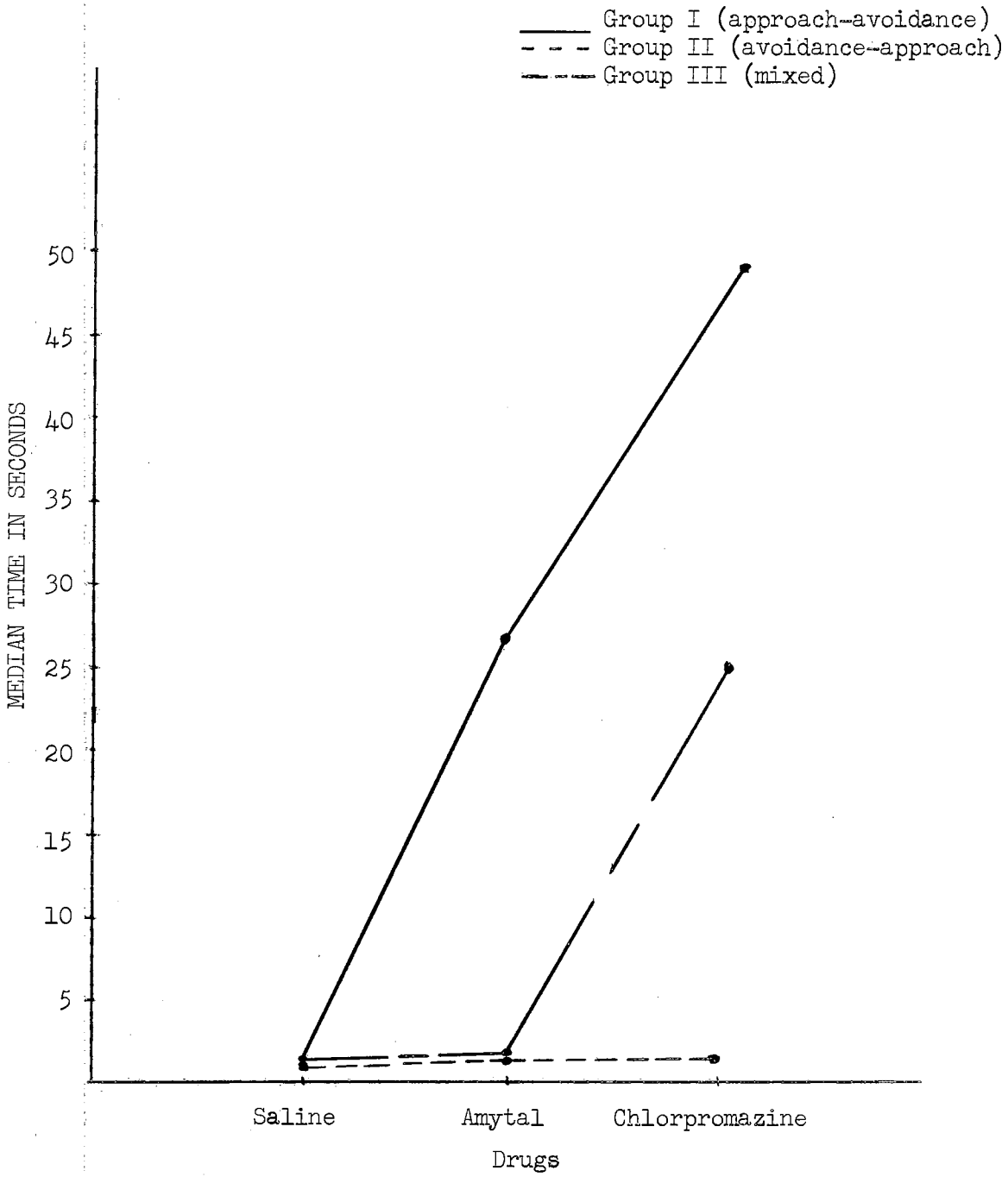

Figure VII

Drug Conditions
Reward Groups
Phase III

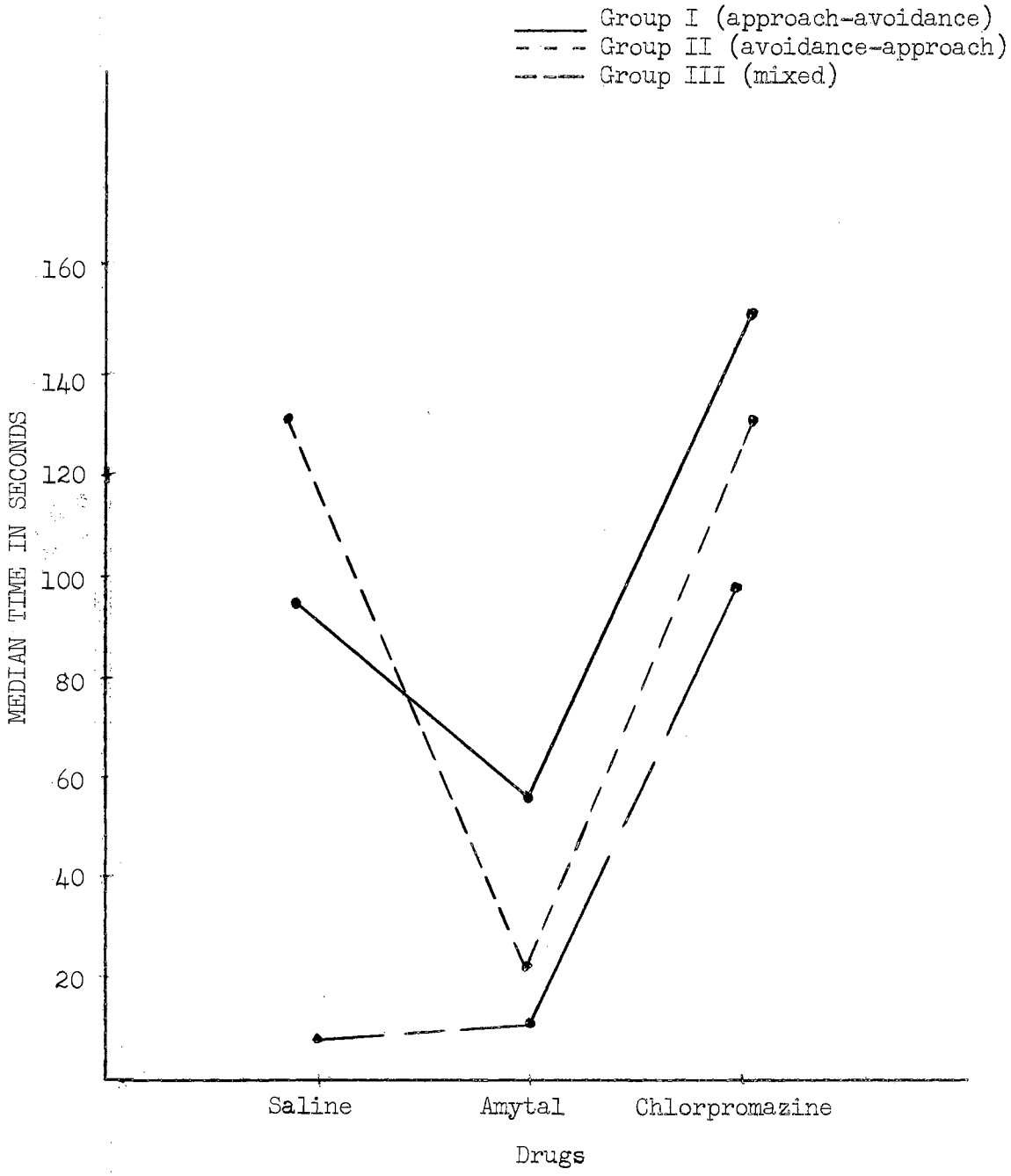

Figure VIII

Drug Conditions
Punishment Groups
Phase III

CHAPTER V

DISCUSSION

This study is primarily concerned with investigating the comparability of differentially induced conflicts. Consequently, of major importance is the finding that group III (mixed) ran the fastest and group I (approach-avoidance) the slowest, with group II (avoidance-approach) occupying an intermediate position, in response to subsequent rewards and punishments. This finding supports the major thesis of this study that different sequences of approach and avoidance training during conflict induction will not produce equivalent conflicts. It was expected that animals given reward would perform at or near asymptotic level, with the absolute differences among groups being small. Group II (avoidance-approach), however, was expected to be faster than groups I (approach-avoidance) and III (mixed). For those animals being punished, on the other hand, it was expected that the absolute differences among groups would be larger -- with group III running the fastest and group I the slowest. These two expectations, with one exception, were confirmed by the data, the exception being the lack of a significant difference among the rewarded groups. The superior resistance of intermittent reinforcement to extinction is a well-established empirical principal. It is not unreasonable to expect a similarly greater resistance when punishment trials are given, particularly if the training involved the use of interspersed punishments, as in the present study. Therefore, group III should show

the greatest resistance to punishment. Secondly, the greater potency of recency as compared with primacy leads one to expect the superiority of group II over group I when additional punishments are given. Since the absolute differences among groups being punished is relatively larger than for groups being rewarded, it is clear that the results cutting across reward/punishment should be similar to the results for the punishment condition alone.

The finding that reward produces faster running than does punishment needs no further comment. More striking, however, is the significant sequence by reinforcement interaction (phase II). Animals trained in the three conflict induction sequences did not differ in their response to additional rewards; punishment, however, reflected the difference in the induction sequences -- group I (approach-avoidance) animals ran the slowest and group III (mixed) animals ran the fastest. Consequently, it can be concluded that reward did not reflect the induction sequence in which conflict was established; whereas punishment did. The explanation for the differential reaction to punishment, by animals trained in three induction sequences was presented in the previous paragraph. The explanation for the failure to obtain differential reactions to reward is more difficult, however. Since group I (approach-avoidance) was considerably the slowest at the beginning of phase II, it is the rapid increment in speed by group I rewarded animals which must be accounted for. Perhaps the high level of deprivation under which animals were maintained plus their previous experience with reward can adequately account for the rapid improvement by these animals when reward was reintroduced. One way to test for this would be to train a group under a lower deprivation state and compare their

performance with a group at the same deprivation level as in the present study. Interest would be in the rapidity with which the latencies declined for the two groups when additional rewards were given.

A complication arises, however, when the sequence by reinforcement interaction obtained from phase III is considered. It will be recalled that, during this stage of training, animals were continued under the previous reinforcement conditions and drugs were introduced. During this phase it was found that the induction sequences showed differential reactions to reward, with group II animals running the fastest and group I animals the slowest. This finding is contrary to the one found during the preceding phase. As to the reason for these contrary findings, no explanation will be attempted.

Another major intent of this study is to investigate the reactions of the groups given the differentially induced approach-avoidance conflict training when the two drugs are introduced. The finding that amytal increased running speed was expected on the basis of other experimental findings reported in chapter II. Previous work has demonstrated that amytal reduces both the tendency to approach and the tendency to avoid a goal object; moreover, it reduces the avoidance tendency to a greater degree than the approach tendency. (Miller, 1961) This finding was also obtained here in the form of a reliable reinforcement by drug interaction. Such consistency was not the case with chlorpromazine, however. The response decrement produced by the introduction of chlorpromazine further confuses the interpretation in regards to the effects of this drug on approach-avoidance conflicts. Some authors have obtained evidence for its avoidance reducing effect, others have reported little or no effect,

while still others have obtained a decrement in response speed as a function of chlorpromazine. (Miller, 1961) In this study chlorpromazine was found to reduce the strength of the tendency to approach a conflictful goal. This occurred under all induction sequences, regardless of whether reward or punishment followed the goal response.

Finally, neither the sequence by drug nor the sequence by drug by reinforcement interactions reached an acceptable level of reliability. Therefore, it is concluded that the three sequences do not show a differential reaction to the three drugs.

The preceding findings have been pretty well in agreement with theoretical expectations and with the hypotheses under investigation. An unexpected finding which is inconsistent with common sense expectations emerges, when one considers the effect of reward preceded by punishment training versus reward with no previous training in the situation. Common sense as well as psychological theory would lead one to expect that the previous experience with punishment which led the animal to avoid entry into the goal box would retard the formation of the approach response when reward was introduced in the goal box. Such was not the case, however, as the group with the previous punished experience acquired the approach tendency significantly faster than did the group with no experience in the situation prior to the introduction of reward. A subsequent analysis which controlled for the amount but varied the quality of previous experience demonstrated that prior experience with reward is more compatible with the establishment of the approach response than is prior experience with punishment. On the basis of these two analyses, it is concluded that previous experience with reward in the goal box is more beneficial in the establishment of an approach tendency than is prior experience with

punishment. Punished experience is more beneficial, however, than is no experience at all.

The exact mechanism by which this effect is accomplished cannot be specified. There are at least two alternative interpretations which would account for this finding: 1) The punishment training produced a drive of acquired fear which served as an energizer when reward was introduced. Since these animals were operating under higher drive they would run faster, once the approach tendency became dominant, than would animals in the other group; 2) The other alternative is based upon the greater experience in the situation on the part of the animals that had received previous punishment. In order to decide between these alternatives, it would have been necessary to have a control group that was given the same amount of previous experience as the punished group but was not subjected to either punishment or reward. This is a problem which deserves future investigation.

Suggestions for Research

What other ideas for future research emerged from this investigation? The one of primary importance concerns the replication of the first two phases of this study using human subjects. Plans are being made to perform this experiment using an apparatus described by Anderson (1962). In addition, any of the studies in the approach-avoidance conflict literature could be replicated using several conflict induction sequences. Finally, drug effects could be investigated by using several sequences of conflict induction. The introduction of the drug at various stages during the acquisition of the conflict would provide a means of evaluating the

influence of the drug on the acquisition of a response, the acquisition of a competing response, and the maintenance of a previously acquired response in the face of a change in reinforcement conditions. A study such as this would have important implications concerning the use of drugs in psychotherapy.

CHAPTER VI

SUMMARY

This investigation was concerned with the effects of rewards, punishments, and drugs on differentially induced approach-avoidance conflicts. Three sequences of conflict induction were used: 1) approach training followed by avoidance training, 2) avoidance training followed by approach training, and 3) mixed approach and avoidance training.

A survey of the literature on approach-avoidance conflicts revealed, with one exception (Miller, 1961), that the approach tendency is established prior to the establishment of the avoidance tendency. It was argued that as a result of the sole reliance on this sequence of conflict acquisition it is impossible to generalize with any great assurance to situations in which the approach tendency is the more recently acquired habit.

The question was raised as to whether an organism trained early in avoidance would differ in response to rewards, punishments, and drugs from one receiving early approach training and subsequent avoidance. In the recent work with drugs, the generality of the finding that sodium amytal reduces the avoidance more than the approach component has been questioned on the grounds that the drug may effect the more recently acquired tendency to a greater degree than the older tendency. By using induction sequences in which the relative ages of the conflicting

tendencies are reversed, an attempt was made to evauate this contention. Also, the work with chlorpromazine has produced conflicting findings. Some investigators have reported that chlorpromazine reduces the avoidance component of an approach-avoidance conflict, others have not obtained this effect. Consequently, an attempt has been made to evaluate the effects of the differentially induced conflicts on response to the drug.

To summarize: Three general questions were examined through the utilization of three sequences of conflict induction.

1. Will the three sequences of induced conflict produce differential effects on the operation of subsequent rewards and punishments?

2. Does amytal derive its fear-reducing properties from its effect on the more recently acquired habit?

3. Chlorpromazine has been found to produce diverse effects on approach-avoidance conflicts; will its effects be consistent when different sequences of conflict are utilized?

In addition to these general questions, several specific hypotheses were formulated and tested.

The training was divided into three phases. During phase I, three groups of rats were given conflict acquisition training -- group I received approach training followed by avoidance training, group II received the reverse, and group III received the approach and avoidance training in a random, interspersed manner. Following this initial training, animals in each of the three groups were divided into two subgroups for the second phase of training. During phase II one subgroup in each condition received additional rewarded trials, the other received the same number of punished trials. In the third phase of training each of the six groups was divided into three subgroups. These final groups were given intraperi-

toneal injections of chlorpromazine, sodium amytal, or isotonic saline solution.

A series of analyses of variance were performed on the "running times" during each phase. For phase I, two noteworthy findings emerged. First, an analysis over the 48 rewarded trials for group I and group II yielded the unexpected finding that group II which received its rewarded trials following punishment ran significantly faster ($<.001$) than group I which received its rewarded trials initially. This suggests that exposure to punishment facilitated performance when contrasted with no exposure to the situation at all. Secondly, all three conflict groups differed highly reliably from one another on the first 24 approach trials, but converged in performance in the latter 24 trials. These findings indicate that the effects of reward become stable with experience irrespective of the nature of the training.

An analysis on the data from phase II revealed that those rats being rewarded ran faster than those being punished at less than the .001 level of significance. More important, however, was the finding that the interaction between the present condition (reward or punishment) and the initial training was significant at less than the .05 level. That is, group III rats showed the greatest resistance to additional punishments and group I the least. Surprisingly, however, the three groups showed equivalent reactions to additional rewards.

During the third phase of training the introduction of drugs provided some complex results. It was found that amytal produced the fastest running and chlorpromazine the slowest, significant at less than the .001 level. Furthermore, the interaction between drugs and reward-

punishment was significant at less than the .01 level. Amytal increased running speed unde punishment but decreased it under reward.

These results clearly demonstrate the undesireability of relying on only one sequence of conflict induction. It has been demonstrated that different sequences of reward and punishment do not produce equivalent conflict in terms of the effects of subsequent rewards and punishments on these conflicts. Applied to practical situations, this data suggests that one needs to know more than the relative balance of reward and punishment in the acquisition of the conflict; one needs to know the induction sequence.

BIBLIOGRAPHY

Anderson, N. On the quantification of Miller's conflict theory. Psychol. Rev., 1962, 69, 400-414.

Bailey, C., and Miller, N. The effect of sodium amytal on an approach-avoidance conflict in cats. J. exp. Psychol., 1952, 45, 205-208.

Barry, H., and Miller, N. Effects of drugs on approach-avoidance conflict tested repeatedly by means of a "telescope alley". J. comp. physiol. Psychol., 1962, 55, 201-210.

Barry, H., Miller, N., and Tidd, G. Control for stimulus change while testing effects of amobarbital on conflict. J. comp. physiol. Psychol. 1962, 55, 1071-1074.

Barry, H., Wagner, S., and Miller, N. Effects of several drugs on performance in an approach-avoidance conflict. Psychol. Rep., 1963, 12, 215-221.

Brown, J. Gradients of approach and avoidance responses and their relationship to level of motivation. J. comp. physiol. Psychol., 1948, 41, 450-465.

Brown, J. Principles of intrapersonal conflict. J. conf. Resol., 1957, 1, 135-155.

Ferster, C. and Skinner, B.F. Schedules of reinforcement. New York: Appleton-Century-Crofts, 1957.

Ford, D., and Urban, H. The learning theory psychotherapy of Dollard and Miller. In Systems of Psychotherapy. New York: John Wiley and Sons, Inc., 1965, pp. 211-272.

Freud, S. The interpretation of dreams. In Standard edition. Vols. IV and V. London: Hogarth Press, 1953. (First German Edition, 1900).

Freud, S. Analysis of a phobia in a five-year-old boy. In Collected Papers. Vol. III. London: Hogarth Press, 1933, pp. 149-295. (First published in German, 1909).

Geller, I. and Seifter, J. The effects of moprobamate, barbiturates, d-amphetamine and promazine on experimentally induced conflict in the rat. Psychopharm., 1960, 1, 482-492.

Grossman, S. Effects of chlorpromazine and perphenazine on bar-pressing performance in an approach-avoidance conflict. J. comp. physiol. Psychol., 1961, 54, 517-521.

Guthrie, E.R. Association by contiguity. In Koch, S. (Ed.) Psychology: a study of a science. Vol. 2. General systematic formulations, learning, and special processes. New York: McGraw-Hill, 1959, pp. 158-195.

Hull, C. The goal-gradient hypothesis applied to some "field-force" problems in the behavior of young children. Psychol. Rev., 1938, 45, 271-299.

Hull, C. Essentials of Behavior. New Haven: Yale University Press, 1951.

Lawson, R. Learning and Behavior, New York: MacMillan, 1960.

Lewin, K. Environmental forces in child behavior and development. In Murchison, C., A handbook of child psychology. Worcester, Mass: Clark University press, 1931.

Lewin, K. A dynamic theory of personality. New York: McGraw-Hill, 1935.

Masserman, J. Drug effects on experimental neuroses in animals. In L. Uhr and J. Miller (Eds.), Drugs and behavior. New York: Wiley, 1960. pp. 250-254.

Miller, N. Experimental studies of conflict. In J. McV. Hunt (Ed.), Personality and the behavior disorders. New York: Ronald, 1944, pp. 431-465.

Miller, N. Liberalization of basic S-R concepts: Extensions to conflict behavior, motivation, and social learning. In S. Koch (Ed.), Psychology: A study of a science. Vol. II. New York: McGraw-Hill, 1959. pp. 196-292.

Miller, N. Some recent studies of conflict behavior and drugs. Amer. Psychol. 1961, 16, 12-24.

Miller, N. and Barry, H. Motivational effects of drugs: Methods which illustrate some general problems in psychopharmacology, Psychopharm. 1960, 1, 169-189.

Overall, J. and Brown, W. Recency, frequency, and probability in response prediction, Psychol. Rev., 1957, 64, 314-323.

Pavlov, I., Conditioned reflexes. G.V. Anrep (Trans.) London: Oxford Univer. Press, 1927.

Spence, K. Behavior Theory and Conditioning. New Haven: Yale Univer. Press, 1956.

Voeks, V. Postremity, recency, and frequency as basis for prediction in the maze situation. J. exp. Psychol., 1948, 38, 495-510.

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