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**Approach and Avoidance Generalization Gradients
and Pregeneralization Response Strength**

by

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This investigation is concerned with generalization gradients of approach and avoidance in human subjects, and deals with one factor that might account for discrepancies reported in the human and infra-human literature: the relative strengths of the pregeneralization response tendencies of approach and avoidance.

Basic to Miller's (1944, 1948, 1959) theory of conflict behavior is the principle that the slope of avoidance is steeper than the slope of approach gradients. In his studies of approach-avoidance conflict training, using strength of pull as the dependent variable, rats that have been deprived of food are given the opportunity to run down an alley to either avoid shock or get food. According to Miller, hunger is based on internal physiological cues and its interoceptive stimuli are common to both the near and far points of the alley. Fear, a learned drive, is more dependent upon situational cues, mainly the stimuli of the shock situation. This results in less generalization between the near and far end of the alley for avoidance behavior and so the avoidance gradient is steeper.

Several investigators, like Miller, have found that approach generalizes more than avoidance (Epstein & Fenz, 1962; Hoffman & Fleshler, 1963; Miller & Kraeling, 1952; Murray & Berkun, 1952; Murray & Miller, 1952; and Wipf, 1964). This difference between approach and avoidance gradients has not been consistently found.

Hearst (1960, 1962, 1965), using monkeys, found that the slope of the approach gradient was steeper than the slope of the the avoidance gradient. He suggested that "Certain types of avoidance gradients for exteroceptive stimuli are relatively flat because proprioceptive and other internal stimuli are the most important cues controlling the avoidance response" (1965, p. 345).

Whether the approach or avoidance gradient is found to be steeper may be a function of the experimental techniques employed, or/and the pregeneralization response tendencies acquired by subjects.

In order to understand why Miller gets a steeper avoidance gradient than approach gradient, it is necessary to analyze the type of conflict situation with which he works. Conflict refers to a state of affairs which is the result of the simultaneous arousal of two incompatible response tendencies of relatively equal strength. A conflict situation might result in oscillatory behavior between the two response tendencies (Hearst, 1967) or "pernicious homeostasis," that is, freezing in the situation (Brown, 1957). Conflict behavior can be distinguished from unambivalent behavior "which refers to actions that can be satisfactorily explained by the invocation of a single dominant tendency with minor disrupting effects of weakly antagonistic tendencies being ignored" (Brown, 1957, p. 76).

Miller and Kraeling (1952) established a pattern of behavior in their rats by first training them to run down an alley for food and then followed this response by avoidance training which was to inhibit the approach response by putting "increasingly strong electric shocks on the food until the animals failed to touch it... for three successive

trials" (p. 218). This was then referred to as an "approach-avoidance conflict" by Miller and Kraeling when, by definition, there was no conflict, merely an unambivalent avoidance situation. The same kind of unequal response tendencies can be found in Murray and Berkun (1952), Murray and Miller (1952), and Epstein and Fenz (1962), although in the latter approach was always greater than avoidance.

In Hoffman and Fleshler's study (1963), rats that were deprived of food could either press a plate which was followed by food reinforcements or press a bar which postponed a shock. During training, both the approach and avoidance contingencies were in effect only in the presence of a 3500-cps tone (discriminative stimulus). A bar press would prevent shock; and, it would also remove the opportunity to obtain food. A plate press might produce food (40% of the time); but, it would also prevent a subject from avoiding the associated shock. During generalization testing, five different tones and the standard tone (3500 cps) were presented. The avoidance gradient was steeper than the approach gradient. However, the criterion that was used for

an approach-avoidance conflict was one in which 86% of the time the standard tones were followed by avoidance responses and 7% of the time, approach responses. This would appear to be an unambivalent avoidance situation.

Of course, it may be pointed out that Hoffman and Fleshler (1963) found steeper avoidance gradients than approach gradients when the two types of training were tested independently of each other. This finding can be explained, however, by noting that they used a partial reinforcement schedule in approach training and discrimination training, and a continuous reinforcement schedule during avoidance training and discrimination training. This partial reinforcement in the approach situation accounts for the greater resistance to extinction for this group. The training technique makes the test stimuli in the discrimination procedure more similar to the original discriminative stimulus (3500 cps tone) since in approach training the tone was not always followed by reinforcement, and in the test situation the stimuli are not followed by reinforcement either. Humphreys (1939) and Wickens, Schroder and Snide (1954) have demonstrated that intermittent reinforcement

increases resistance to extinction and tends to flatten generalization gradients. Rather than postulating intrinsic differences between approach and avoidance gradients, it may be that the more difficult discrimination of the approach group from training to testing accounts for the differences between the gradients of Hoffman and Fleshler (1963).

In Wipf's (1964) approach-avoidance conflict, human subjects were instructed to react as quickly as possible to one of two stimuli. Pressing one response key in the presence of a tone (S^D) was followed by monetary gain and termination of the tone (approach); pressing the other response key while being shocked (S^D) was followed by monetary loss and termination of the shock (avoidance). The two discriminative stimuli were presented every 12 seconds in a randomized order; during generalization testing they were presented with reduced intensity at 3, 6, 9, and 12 seconds. Avoidance gradients were steeper than approach gradients for the established temporal generalization gradients, however, the significantly faster reaction speeds to the negative stimulus than to the positive stimulus with the 12 second interval during training and testing indicates

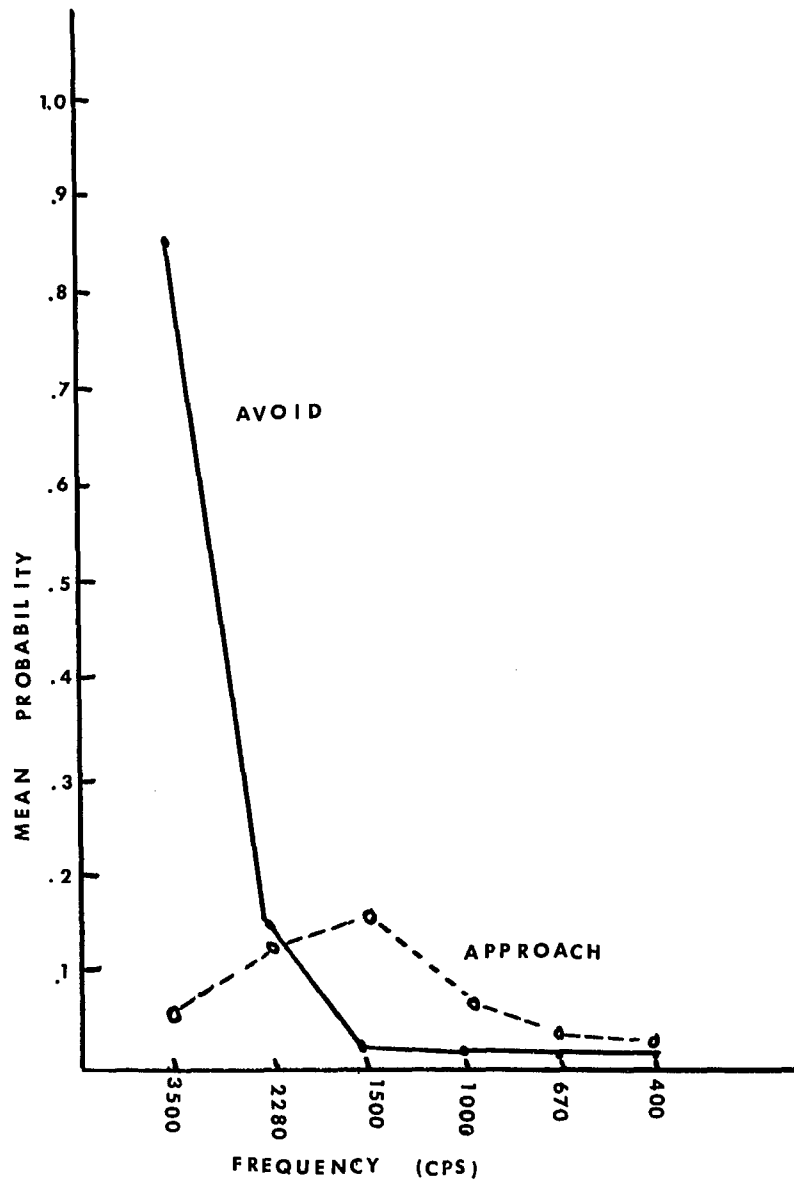
that avoidance response tendencies were greater than approach response tendencies; another illustration of an unambivalent avoidance situation.

The relationship of magnitude of reinforcement and drive level to the shape of generalization gradients is an important factor to be considered with respect to the shape of approach-avoidance generalization gradients. Appel (1963) demonstrated that bar pressing responses for food reinforcements can be suppressed by concurrently administering varying intensities of shock; the degree of suppression is a function of the intensity of the shock. Masserman (1943), Lichtenstein (1950), Annau and Kamin (1961), Walters and Rogers (1963) and Hoffman (1965) have also demonstrated similar conditioned suppression. Hoffman has shown that, "Exposure to a noxious event which is consistently preceded by a neutral stimulus endows that stimulus with the capacity to suppress behavior, and stimuli which are similar to it also exhibit this capacity" (1965, p. 371).

Since most research involving approach and avoidance generalization gradients have experimental designs where conflict situations are based on unequal response tendencies between approach and avoidance (avoidance usually being greater than approach), the rate of approach responses has been considerably reduced; approach responses will not be generalized to other stimuli if they are not being emitted.

Consider the findings of Hoffman and Fleshler (1963, see Figure 1). At the onset of extinction (generalization testing) more avoidance responses are being emitted than approach responses (conditioned suppression) to the discriminative stimulus. The increase in probability of approach responses at the 1500 cps generalization stimulus from the probability of approach responses emitted to the original 3500 cps discriminative stimulus illustrates the weakening of conditioned suppression. Generalization of conditioned suppression is a direct function of the "physical similarity between the stimulus and the one involved in the original aversive training" (Hoffman, 1965, p. 371). It is difficult to say whether differences in generalization gradients of approach and avoidance reflect fine differences

Figure 1 "The generalization gradients of approach and avoidance, during conflict. (These functions show the mean probability of approach and avoidance responses — plate press for food and bar press to prevent shock — to the S_D , 3500 cps, and to the five test frequencies during the initial session of the test for stimulus generalization under conflict.)" (Hoffman and Fleshler, 1963, p. 288). Figure redrawn from p. 288.



in the basic nature of approach and avoidance, or parametric variations of the conflict task.

Before analyzing the apparent discrepancies between the findings of Miller (1959) and Hearst (1965), consider the following issues: (1) What are the effective stimuli in avoidance situations; are they external or internal stimuli? (2) Are the same stimuli the effective ones in all avoidance situations?

The answer to the first question is that the effective stimulus is dependent upon the particular experimental technique. In order to have stimulus control, differential reinforcement with respect to the specified stimulus is necessary (Terrace, 1966). This can be done with external cues such as wave length (Guttman & Kalish, 1956), size changes (Miller & Kraeling, 1952) and line tilt (Honig, Boneau, Burstein, and Pennypacker, 1963), or with internal cues such as proprioception (Riccio, Urda, and Thomas, 1966). In some designs the effective stimulus is an external stimulus; whereas in other experimental designs, it is an internal stimulus. Also, it is possible that there is no

effective stimulus, but "effective stimuli," that is, some combination of external and internal stimuli. Also, the stimulus that the experimenter chooses as S^D may not function as the effective stimulus for the subject.

In reference to the second question, evidence seems to indicate that no single stimulus type is effective for all avoidance situations. Investigating the type of avoidance training that is involved in the studies of Miller and of Hearst, it becomes evident that Miller uses a discriminated avoidance design; that is, different distances from the goal (external stimuli) act as warning signals or discriminative stimuli for the subject. In Hearst's research, there are no experimentally designated external cues or discriminative stimuli available to the subject in avoidance.

Hoffman (1966) suggests that when non-discriminated avoidance is compared to discriminated avoidance, there are significant differences in the respective behaviors which emerge from the procedures that question whether or not these techniques involve identical mechanisms. Differences include

different controlling stimuli in the two types of avoidance situations, as demonstrated by the studies of Miller and of Hearst on approach-avoidance generalization gradients.

In Hearst's work (1960, 1962, 1965) on approach-avoidance conflict training, there were no external discriminative stimuli similar to each of the reinforcement schedules. He trained monkeys on a concurrent schedule of variable interval food reward and Sidman avoidance, both in the presence of a fixed intensity of light. The generalization test consisted of presenting lights of varied intensities with the reinforcement contingency no longer in effect.

A possible explanation for Hearst's findings is that he was merely looking at differences in resistance to extinction, not stimulus generalization (Hearst has acknowledged this possibility, 1965). In the variable interval schedule, the delivery of food acts as a discriminative stimulus for the subject; this gives the feedback that the reinforcement contingency is still in effect.

The Sidman avoidance subject gets no similar information once the schedule has been successfully established. The subject rarely gets a shock and so "extinction" is not easily discriminated by the subject as "extinction" per se. The Sidman avoidance subject has no way of discriminating extinction from successful avoidance responding. Because of this basic difference between the approach and avoidance situations, avoidance responses should persist for a long time even during extinction. "Conditions during SAV training are more similar to those during SAV extinction than is the case for VI training and extinction"(Hearst, 1965, p. 345). Hearst's findings then may be due to resistance to extinction of the Sidman avoidance behavior.

In terms of different extinction rates for avoidance and approach, the same problem was inherent in Miller's (1952) research. In fact, Miller and Kraeling (1952) made this discrepancy more pronounced when they put a little pellet of moist clay in place of the usual food pellet during their test trials for stimulus generalization. Certainly this discriminative stimulus would increase the

approach response strengths during extinction. This made extinction more similar to approach than to avoidance (cf. Hearst, 1965).

Although most of the studies on generalization gradients of approach and avoidance use infra-human animals, the implications of their results are generally applied to human behavior (Gordon, 1963; Maher, 1966; Miller, 1948, 1964; Dollard & Miller, 1950; Murray, 1954, 1961). Miller's findings and theories are used to explain the clinical suppositions that neurotic and psychotic individuals show extreme stimulus generalization. For example, the spread of phobic, compulsive, or anxiety reactions to novel situations, and the psychoanalytic concept of displacement (especially its implications to projective techniques) are viewed as functions of approach and avoidance gradients. The need to investigate generalization gradients of approach and avoidance at the human level is clear.

In reviewing the experimentation in the area, it seems possible that the various findings of differences in approach and avoidance generalization gradients may be attributed to differences in response strengths of approach and avoidance. By varying parameters of reinforcement and thus response strengths, it may be possible to manipulate gradients such that when the approach response tendency is equivalent to the avoidance response tendency, the differences between the gradients will collapse; that is, the steepness of the gradients can be varied by altering the pregeneralization response strengths of approach and avoidance. The present study will test whether differences in value of reinforcements affects height and slope of approach and avoidance gradients, or more specifically, whether or not relative pregeneralization response strength is one of the major determinants of the shape of approach and avoidance gradients.

Method: General Outline

College students were exposed to a complex four part disjunctive reaction time situation: I- Approach ($S^D_{\underline{L}}$) - Approach ($S^D_{\underline{R}}$), II- Approach ($S^D_{\underline{L}}$) - Avoidance ($S^D_{\underline{R}}$), III- Approach (S^D_1) - Avoidance (S^D_{14}), and IV- Generalization Testing ($S^D_1 \dots S^D_{14}$). S^D_X refers to the discriminative stimulus that is used for responding. \underline{R} is the light on the right; \underline{L} , the left; 1 is line stimulus 1, and 14, line stimulus 14.

Part I

In the first part, Approach ($S^D_{\underline{L}}$) - Approach ($S^D_{\underline{R}}$), each subject was instructed that for each trial the speed of his response to either the right or left response key, respectively in the presence of either the right or left light signal, would determine whether or not he would earn money for that response. Responding which was followed by monetary gain always constitutes our approach situation.

Part II

In the second part of the study, the same stimuli and motor responses as in Part I were utilized. The subject was then informed, however, that one of his responses was an "avoidance response;" that is, for the designated stimulus and response, his response speed would determine whether or not he would lose money on that trial. The other stimulus-response combination still permitted him to earn money. Responding which could avert or cancel a monetary loss always constituted our avoidance situation. (The designated "avoidance response" was on subject's left for half the subjects.) The response key, designated as the avoidance response in Part II, remained the avoidance key throughout the rest of the study; likewise, the response key designated as the approach response in Part II, remained the approach response throughout the rest of the study.

Part III

In the third part of the study Approach (S^D_1)-Avoidance (S^D_{14}), the subject was informed that the contingencies were still the same as in Part II, except that two line lengths presented on a central display would be used as the signals to respond instead of the two lights

(Line 14 was designated as the avoidance stimulus for half the subjects).

Part IV

In Generalization Testing ($S^D_1 \dots S^D_{14}$), subjects had the option of making either approach or avoidance responses to test stimuli that differed in length from the two original line stimuli; these stimuli formed a continuum between the two discriminative stimuli.

Two measurements were used as dependent variables: response latency and probability of response. Response latency, in this study consists of the combination of two measurements— time between the presentation of a stimulus and the initiation of a response (reaction time), and time from the initiation of the response to its completion (movement time). Response latency is a conventional measure of response strength (Spence, 1956), and variations in incentives constitutes one way to affect response latency (Johnson, 1922).

Based on relative response strength differences from Part I to Part III, subjects were assigned a posteriori to one of three groups; either an Approach-Predominant group, an Avoidance-Predominant group, or an Equivalent group. For subjects in the Approach-P group, approach response strength was relatively greater than avoidance response strength; in the Avoidance-P group, the reverse was true. In the Equivalent group neither the approach or avoidance response strengths were predominant. Differences among the three groups in generalization testing constituted the test of the hypothesis that approach and avoidance generalization gradients are functions of relative response strengths of subject's pregeneralization approach and avoidance response tendencies.

Method

Subjects

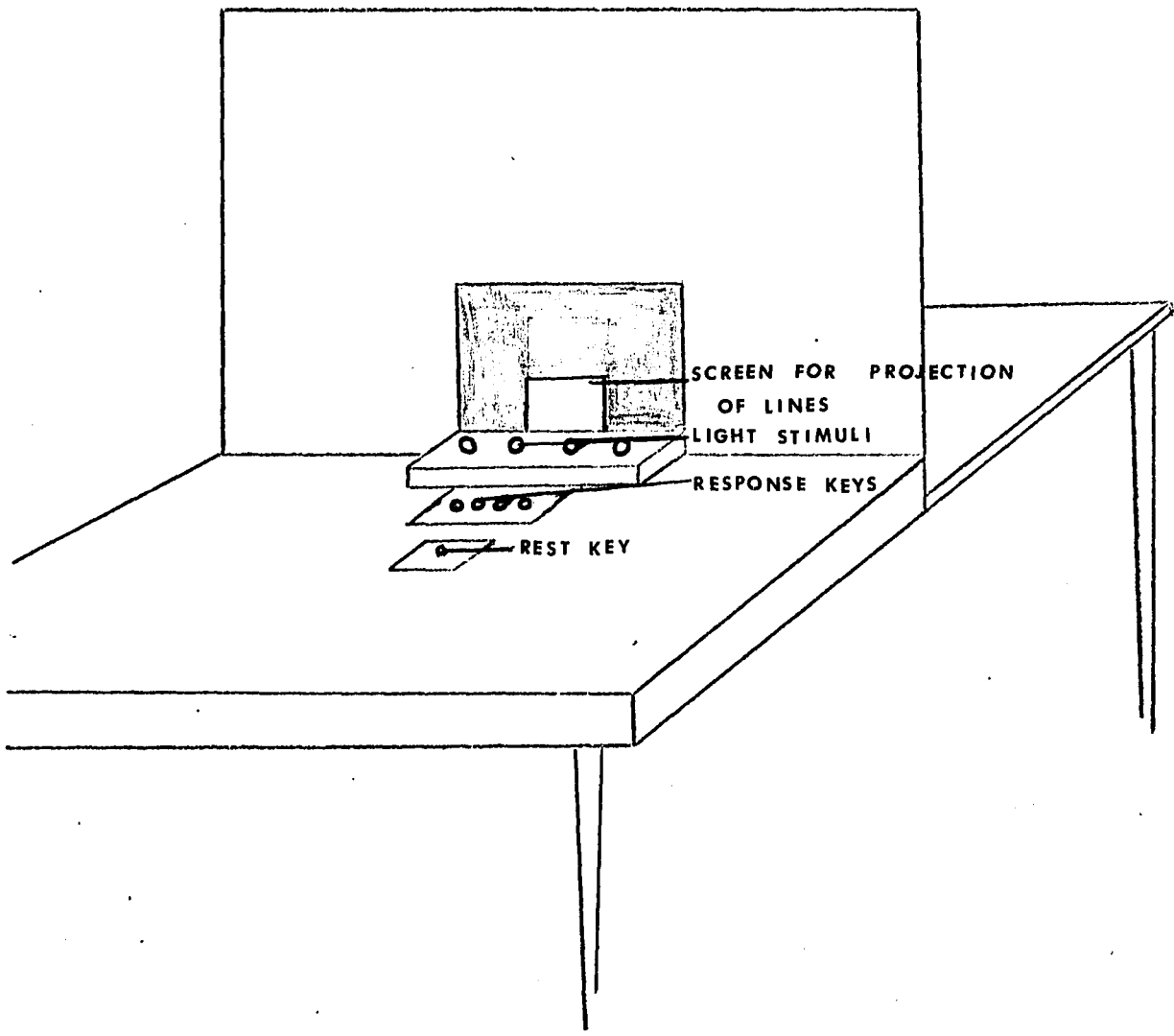
The subjects were male and female students enrolled in various courses in The City University of New York. They were informed that the study would take an hour and that they could earn money; participation was voluntary. A total of 101 subjects were utilized; 11 were eliminated because of apparatus malfunction and 5 because of their difficulty understanding the instructions. The remaining 85 were assigned, a posteriori, to one of three major groups on the basis of relative differences in their response strengths to approach and avoidance stimuli from Part I to Part III of the study.

Apparatus

A modified reaction time apparatus (model 302, Lafayette Instrument Company, Lafayette, Indiana; see Figure 2) was used. It was placed on a table. The subject rested his arm on a bed of foam rubber and his index finger on a microswitch rest key that was flush with the 7.62 cm layer of foam rubber.

Figure 2 Schematic of apparatus: subject's view.

10 CM



The distance of the foam rubber bed from the edge of the table to the display unit of the reaction time apparatus was 49.5 cm. The distance from the subject to the display screen is 49.5 cm. The rest key was centered between and 7.62 cm in front of the four response keys of the reaction time apparatus. Only the center two response keys were used; they were 3.2 cm wide. These response keys were also surrounded by and flush with the foam rubber bed.

Four light apertures were located directly behind the four response keys. They were on top of a raised panel which extended 3.78 cm above the foam rubber. Each aperture had a diameter of 3.2 cm, and were separated from each other by a distance of 2.7 cm. Only the center two apertures were used.

Centered directly behind the light apertures on the back screen (13.8 cm high, 29.2 cm wide) of the reaction time apparatus was a display screen (8.2 cm high, 10.2 cm wide). Surrounding the back screen of the apparatus was a black shield which extended on both sides of the screen

33 cm, and above the screen, 33 cm (see Figure 2). This placed the experimenter out of view of the subject.

On the side of the apparatus, shielded from the subject, was a projector with a remote control timer (Keystone Projector - model k310, Lafayette Instrument Company, Lafayette, Indiana), a shutter (Lafayette Shutter, Lafayette Instrument Company, Lafayette, Indiana) with a Wratten Gelatin Filter- No. 96, N.D. 0.80 covering it (Eastman Kodak Company, Rochester, New York) and two chronoscopes (Lafayette Instrument Company, Lafayette, Indiana). The projector was used to display the line stimuli. The apparatus was programmed so that the presentation of a stimulus (either line or light) started a chronoscope. When the subject lifted his finger off the rest key the first chronoscope stopped and a second was set into operation. The second stopped as soon as the subject pressed a response key. This gives us response speed (reaction time and movement time). As the subject made his response, a light signal indicated to the experimenter which response key was depressed. A verbal ready signal was given and two seconds afterwards the stimulus was presented.

The line slides were made by mounting strips of tape from an ACS black tape pen - 3.2 mm wide (ACS Tapes Incorporated, Newton, Massachusetts), on the center of Gepe slide binders (A B Biwex Company, Sweden).

All of the tests were conducted in relatively quiet and well lighted areas that are specifically designated for psychological research at The City University of New York.

Stimuli

In Parts I and II of the study, there were two discriminative stimuli, identical lighted apertures, 3.2 cm in diameter. In Part III of the study, the lights were not used; the discriminative stimuli were two black lines of different lengths. Each line was mounted on a transparent background and was projected on the back of a translucent screen. The front of the screen was located in front of the subject, at eye level. The actual sizes of these projected lines when measured directly on the screen were 12.6 mm long x 5.7 mm wide, and 34.8 mm long x 5.7 mm wide (References to line lengths will be made in terms of their size on the screen in front of the subject).

In Generalization Testing (Part IV), the two discriminative stimuli and a series of 12 lines of the same width, but different lengths, were presented to each subject. Altogether, subjects viewed 14 lines. From each discriminative stimulus, 6 lines were constructed that differed along a psychological continuum scaled in JNDs (difference thresholds - DL) either upper (DL_U) or lower (DL_L). In a pilot study, using the reaction time apparatus, and the method of constant stimuli, the DL_U for a horizontal line 12.7 mm long x 5.7 mm wide was 2.4 mm; the DL_L for a 24.9 mm line x 5.7 mm wide was 4.8 mm.

Based on the pilot work, six lines were then constructed that differed from each of the discriminative stimuli by 0.5 JNDs. For convenience, the numbers 1 - 14 will be assigned to the lines in ascending order of size; the 12.7 mm line will be referred to as line 1, and the 34.9 mm line, as line 14. The array of lines used is described in Table 1.

TABLE 1
Generalization Stimuli: Projected Line Lengths

Line	Projected Line Length ^a	Log mm
1	12.7 mm	1.10
2	13.9 mm	1.14
3	15.1 mm	1.18
4	16.5 mm	1.22
5	18.1 mm	1.26
6	19.7 mm	1.29
7	21.5 mm	1.33
8	22.2 mm	1.35
9	24.0 mm	1.38
10	25.8 mm	1.41
11	27.9 mm	1.45
12	30.0 mm	1.48
13	32.4 mm	1.51
14	34.9 mm	1.54

^aWidth was constant (5.7 mm)

Procedure

Before actually proceeding with the study, each subject completed a form indicating his name and address. The statement "I have accepted from ____ the sum of ____ for participation in a study at Hunter College..." was printed on the form (see Appendix). Subjects were asked to leave the "sum" blank until completion of the study at which point they were instructed that they would be informed how much money they had earned. This was designed to facilitate the credibility of "being able to earn money" for each subject.

Part I (Approach, S^D_I - Approach, S^D_R). In Part I, disjunctive response latencies were ascertained for each subject, tested individually. The following instructions were read:

Your task is to earn as much money as possible in this study. You can make money by correctly pressing either one of these two response buttons (E points to response keys) when the appropriate signal appears. I shall keep track of how much money you earn and will give you that amount at the end of the completed study.

Now- you must put your index finger of your preferred hand on this rest button (E points to micro-switch) when you hear the ready signal, and hold it down. A few seconds after the ready signal, one of

20 responses are made on the right response key and 20 responses, on the left. The first five responses on each side were considered practice trials.

Part II (Approach, S^D_L - Avoidance, S^D_R). In the second part of the study, the following instructions were read to the subjects:

Your task is still to earn as much money as possible. This time we shall arrange things a bit differently. When the light on the left (right) goes on, you can earn five cents by reacting fast enough to the appropriate response button as in the first part of the study.

However! When the light on the right (left) goes on, you will lose five cents if you do not react fast enough to the appropriate response button; that is, you can avoid a loss of five cents by responding fast enough to the appropriate response button.

The light will always go off immediately after each response regardless of whether you earned or lost money for that response. Always press the response button all the way down. Are there any questions?

Again, to any questions, the instructions were re-read. The lights were then presented as in Part I. The foreperiod and inter-trial intervals were also the same.

Part III (Approach, S^D₁ - Avoidance, S^D₁₄). After a five minute rest period, the third part of the study was administered. In Part III, Part II was basically replicated except the lights were replaced as discriminative stimuli by two different line lengths. The following instructions were read:

Your task is still to earn as much money as possible. Now, instead of using lights as signals, we are going to use lines. When the following line appears on the screen, you can earn five cents by reacting fast enough to the response button on the left (right) as you did before. I will show you the line now. Try and remember this line as you will be asked to identify it later (E shows line to S for 30 seconds).

However, when the following line appears on the screen, you will lose five cents if you do not react fast enough to the response button on the right (left) as you did before. That is, you can avoid a loss of five cents by responding fast enough to the appropriate response button. I will show you the line now. Try and remember it as you will be asked to identify it later (E shows line to S for 30 seconds).

The lines will always go off immediately after your response regardless of whether you earned or lost money for that response. Always press the response button all the way down. Are there any questions?

In order to balance the groups of subjects, for different individuals the minus five cents value was changed to minus ten cents or minus one cent. In this way, we increased the pregeneralization approach or avoidance tendencies of the subjects and were able to obtain subjects falling into each of the three groups.

In Part III, lines 1 and 14 were used for the approach and avoidance signals. For half the subjects, line 1 was the avoidance signal; for the other half, line 14 was the avoidance signal. The presentation of stimuli was done the same way as in Parts II and III, however, only 15 trials were given to each line.

Part IV (Generalization Testing, $S^D_1 \dots S^D_{14}$). In Part IV the following instructions were read:

We are going to continue to do the same thing. Your task is still to earn as much money as possible. Now, however, sometimes other lines will appear on the screen. You are only to respond to the original lines: the plus five cents line and the minus five cents line. If you do not make a response to a line, after a few seconds, I shall say "now." Then, if you think the line looks more like the plus five cents line, you must press the response button on the left (right). If you think the line looks more like the minus five cents line, you must press the response button on the right (left). Always press the response button all the way down. Are there any questions?

The generalization stimuli (14 different lines) were then presented, randomly arranged in blocks of 14. Each line was shown a total of six times. The inter-trial interval was a variable ten seconds; the foreperiod, fixed at two seconds. Upon the presentation of a generalization stimulus, the subject had one of three possible choices: he could make an approach or avoidance response, or neither. If a subject did not make a response within three seconds from stimulus presentation, the verbal "now" signal was given. The subject then had only two choices available: an approach or avoidance response. An approach or avoidance response made within the three seconds when three choices were available is categorized as a spontaneous response. Responses made after "no response" was eliminated as an alternative, is designated a forced response. The number of responses, both forced and spontaneous, that the subject gave to the test stimuli constituted our measurement of generalization.

Group Selection

Subjects were assigned to one of three major groups (Approach-P, Avoidance-P, and Equivalent groups) based on relative differences in their response strengths to approach and avoidance stimuli from Part I to Part III of the study. The differences between Part I and III were used for subdividing subjects instead of Parts I and II because it was ascertained that subjects changed their hypotheses about being financially "behind, even, or ahead" during the five minute rest period which followed Part II; and consequently, their response latencies to approach and avoidance stimuli in Part III were modified. For example, a subject whose differences in relative response strength from Part I to Part II might have placed him in the Avoidance-P group could change his style of responding (relative response strengths) in a contradictory manner from Part II to Part III. Both the data and comments of subjects supported this finding. Since our main concern is subjects' strength of responding just prior to generalization testing, for group placement, the differences between Part I and III were used.

Essentially, the major differences between Part I and Part III are that in the latter, one response key is by specific instructions an avoidance response; whereas in the former, both response keys were by specific instructions approach responses. In Part I, the occurrence of any response pattern, such as shorter reaction latencies on the right response key, can be accounted for only in terms of individual differences, in right and left responding. However, any relative differences in reaction latency patterns from Part I to Part III is indicative of the relative response strengths of both "approach and avoidance" since these changes can be attributed to the introduction of the avoidance response. Factors such as fatigue or practice would be expected to have uniform overall effects on Part III responding, not directional effects. Any variations in responding that might be a function of the line lengths of the two discriminative stimuli in Part III were equally distributed by counterbalancing (for half the subjects, line 1 was the approach stimulus; for half, the avoidance stimulus).

After the basic analysis of reaction latency and response movement time was done on all subjects, 20 were chosen for each of the three major groups. The 40 subjects for the Avoidance-P and Approach-P groups were selected by choosing individuals with the greatest differences in their total net scores; subjects in the Equivalent group were randomly selected from those available.

Although only the subject's preferred hand was used in the approach and avoidance reaction latencies in Part III, the response did involve two distinctive movements toward the front left and front right of the rest microswitch. Since for half the subjects, approach was on the right, and for half, avoidance was on the right; the assignment to the three groups could only be made after taking into account the differences in reaction latency that is related to the directional aspects of reaction latency. This is determined by the reaction latency in Part I, where both stimuli were associated with the same approach contingencies. Therefore, for each subject, the mean reaction latency to each side in Part I was considered the respective baseline reaction latency. The mean reaction latency to the same side in Part III was then subtracted to get a "net avoidance" and a "net approach" reaction latency.

The direction and magnitude of these net reaction latencies were used to assign subjects to the Approach-P, Avoidance-P, and Equivalent groups. The following procedures were followed. First, Part III reaction latencies

were subtracted from Part I reaction latencies for each side, for example: (Part I, Left, Approach) minus (Part III, Left, Avoidance), and (Part I, Right, Approach) minus (Part III, Right, Approach). The "net avoidance" was subtracted from the "net approach" to give a measurement of response strength. An arbitrary cut off point of ± 20 milliseconds was used to form the groups; if the "net avoidance" subtracted from the "net approach" was greater than + 20 milliseconds, the subject was placed in the Approach-P group; if the "net avoidance" subtracted from the "net approach" was less than - 20 milliseconds, the subject was placed in the Avoidance-P group. If the "net avoidance" subtracted from the "net approach" was between + 20 and - 20 milliseconds, the subject was placed in the Equivalent group. The following examples will aid in understanding the procedures employed:

Subject 27

	<u>Part I</u>	<u>Mean RL</u>	<u>Part III</u>	<u>Mean RL</u>
Left	Approach	60 msec ^a	Approach	90 msec
Right	Approach	50 msec	Avoidance	55 msec
Approach I - Approach III = - 30 msec (net approach)				
Approach I - Avoidance III = + 5 msec (net avoidance)				
Net Approach - Net Avoidance = - 25 msec				

^aThese are hypothetical scores.

Thus the reaction latency to the same side in Part III showed greater relative increase to the approach stimulus, and this subject is assigned to the Avoidance-P group.

Subject 37

	<u>Part I</u>	<u>Mean RL</u>	<u>Part III</u>	<u>Mean RL</u>
Left	Approach	60 msec	Approach	30 msec
Right	Approach	50 msec	Avoidance	48 msec

Approach I - Approach III = 30 msec (net approach)
 Approach I - Avoidance III = 2 msec (net avoidance)

Net Approach - Net Avoidance = 28 msec

Thus the reaction latency to the same side in Part III showed greater relative reduction to the approach stimulus, and the subject is assigned to the Approach-P group.

Subject 45

	<u>Part I</u>	<u>Mean RL</u>	<u>Part III</u>	<u>Mean RL</u>
Left	Approach	60 msec	Approach	50 msec
Right	Approach	50 msec	Avoidance	45 msec

Approach I - Approach III = 10 msec (net approach)
 Approach I - Avoidance III = 5 msec (net avoidance)

Net Approach - Net Avoidance = 5 msec

The reaction latency to the same side in Part III showed relatively no change from Part I; he was assigned to the Equivalent group.

In order to control for the reliability of these differences, each individual had to be placed in a particular group not only with reference to his total net score, but also on the basis of split-half (odd-even) classification. So, for any subject, placement in a group was contingent upon three measurements: the net scores based on total scores, net scores based on odd trials, and net scores based on even trials. Only when all three were consistent was a subject included in either the Approach-P, or the Avoidance-P groups. In the cases where discrepancies existed (all three were not consistent), subjects were placed in the Equivalent group.

Subjects were placed in various cells within the major groupings (Approach-P, Avoidance-P, or Equivalent groups) on the basis of the response key side (right or left) and discriminative stimulus (line 1 or 14) for the avoidance response. Hence, there was a total of 12 groups, making a 3(Groups) by 2(Discriminative Stimuli) by 2(Response Key Side) factorial arrangement of conditions.

Results

The generalization data were produced by considering two types of response demands involved in Part IV of the study (Generalization Testing, $S^D_1 \dots S^D_{14}$). Subjects were instructed to respond only to the discriminative stimuli for approach and avoidance (lines 1 and 14) used in the original training. Therefore, when each stimulus was presented, the subject had three choices - an approach or avoidance response, or neither. A response made in this situation to the generalization stimuli is viewed as a failure of discrimination and, in this paper, is referred to as a "spontaneous" response. If the subject did not make an approach or avoidance response when a stimulus was projected, he was instructed to make a choice between these two alternatives; the subject then had two choices - an approach or avoidance response. A response made in this situation is referred to as a "forced" response.

Two sets of generalization data were generated from these two different response sets: gradients consisting of both spontaneous and forced responses, and gradients of only spontaneous responses. The former gradients will be referred to as two choice response data; the latter, as three choice response data. Part I of the results section will be concerned with the two choice data, and Part II, the three choice data.

In order to balance the number of subjects in each of the 12 cells, 27 subjects received asymmetrical pay-off instructions (+5¢ for approach and either -1¢ or -10¢ for avoidance); whereas, 33 received symmetrical pay-off instructions (+5¢ for approach and -5¢ for avoidance). Since it has been demonstrated that with asymmetrical pay-offs, subjects will prefer the response that has greater value (Galanter, 1962); it is possible that the differences found in our study reflect this phenomenon. Table 2 has the mean number of two choice approach responses of each of the major groups broken down according to pay-off schedules.

TABLE 2
 Mean Number of Two Choice Approach Generalization Responses
 Of Groups With Respect To Pay-Off Schedules

Group	Asymmetrical Pay-Off		Symmetrical Pay-Off	
	N	Mean ^a	N	Mean ^a
Approach-P	11	48.4	9	44.3
Avoidance-P	7	38.0	13	40.5
Equivalent	9	45.5	11	42.0

^aBased on a total of 84 responses per subject.

To test the null hypotheses, t tests were done between those subjects who had asymmetrical and symmetrical pay-offs in each of the three groups; the null hypothesis was not rejected in any of the three groups ($t < 1.0$).

Part I

Between groups comparisons of the two choice approach generalization responses. This analysis is concerned with the approach generalization gradients that were formed by combining the spontaneous and forced choice approach responses that were made by each of the three primary groups: Approach-P, Avoidance-P, and Equivalent groups. These are considered two choice situations because the subject spontaneously made an approach or avoidance response (even though a "no" response choice was available) or because, by instructions, only the two choices were available.

Since neither the Fs for the main effects of Side, or Discriminative stimuli were statistically significant (see

Table 3), these categories were collapsed for the intensive analysis of the effects of response strength (delineated by placement in either the Approach-P, Avoidance-P, or Equivalent groups) on the form of the generalization gradients for approach and avoidance.

As can be seen in Figure 3, where differences do occur among groups, the Approach-P group made more approach responses than either the Avoidance-P, or Equivalent groups, with the Avoidance-P group making the fewest. The greatest differences in mean number of generalization responses appear in the middle of the range of generalization stimuli, with all three groups making almost perfect discriminations to the two end stimuli - the discriminative stimuli for approach and avoidance. Very few differences in responding are observed among the three groups with respect to the discriminative stimuli for approach and the generalization stimuli that range as much as four units from the discriminative stimuli for approach. For all groups,

TABLE 3
 Between Groups Analysis of Variance of the Two Choice
 Approach Generalization Responses

Source	df	MS	F
Groups ^a	2	240.0	4.25*
Response Side ^b	1	1.0	.02
Discriminative Stimulus ^c	1	16.0	.28
Groups x Side	2	15.5	.27
Groups x S ^D	2	120.5	2.13
Side x S ^D	1	199.0	3.52
Groups x Side x S ^D	2	43.5	.77
Within Treatments	48	56.5	
Total	59		

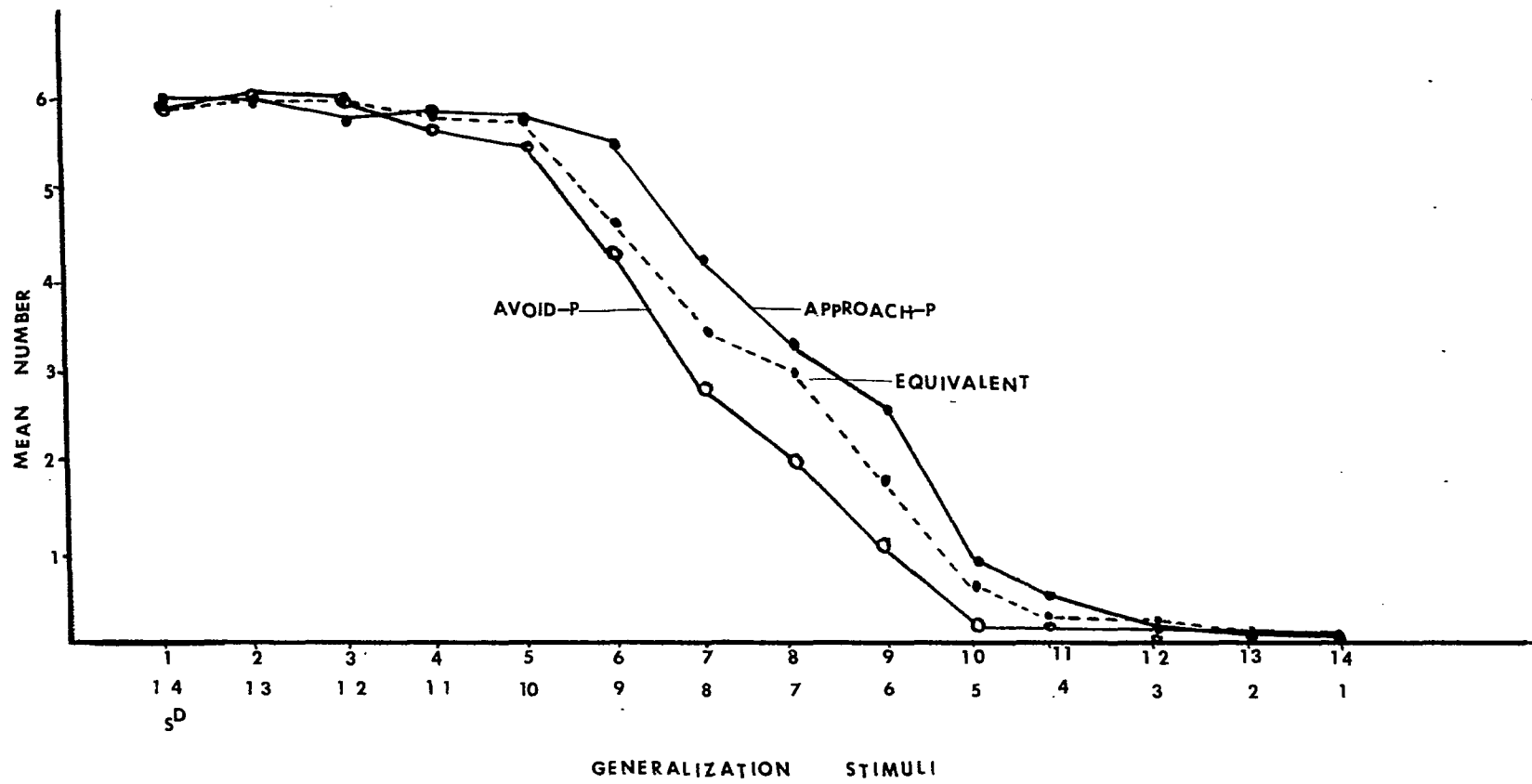
^aApproach-P, Avoidance-P, or Equivalent groups.

^bLeft or right side for avoidance responses.

^cDiscriminative stimulus 1 or 14 for avoidance.

*p<.05

Figure 3 Approach generalization responses: two choice data.



90% of the responses emitted to this range of stimuli were approach responses. The greatest gap among groups seems to occur at the generalization stimuli six units from the discriminative stimuli for approach. To these stimuli, the Approach-P group emitted approach responses almost 70% of the time; whereas the Avoidance-P group emitted approach responses less than 50% of the time. The mean number of two choice approach responses that were made by each of the three groups to each of the 14 test stimuli appears in Table 4. The differences observed in Figure 3 and Table 4 did not occur by chance as is supported by the analysis of variance for a 3(Groups) by 2(Discriminative Stimuli) by 2 (Response Side) factorial design (Edwards, 1965) which is reported in Table 3. The F for Groups was statistically significant beyond the .05 level of confidence.

TABLE 4

Mean Number of Two Choice Approach Generalization Responses
to Six Presentations of Each of the 14 Stimuli

Stimuli		Approach-P	Avoidance-P	Equivalent	
1 ^a	14 ^a	M	6.00	5.95	5.95
		SD	.00	.22	.22
2	13	M	5.95	5.95	6.00
		SD	.22	.22	.00
3	12	M	5.80	5.75	6.00
		SD	.70	.44	.00
4	11	M	5.90	5.70	5.80
		SD	.31	.57	.41
5	10	M	5.85	5.50	5.80
		SD	.37	.83	.52
6	9	M	5.50	4.35	4.65
		SD	1.00	1.87	1.46
7	8	M	4.20	2.85	3.50
		SD	1.85	2.11	2.21
8	7	M	3.25	1.95	3.00
		SD	1.65	1.60	2.32
9	6	M	2.60	1.05	1.75
		SD	2.30	1.47	1.94
10	5	M	.90	.25	.60
		SD	1.48	.55	1.14
11	4	M	.35	.20	.30
		SD	.75	.52	.57
12	3	M	.15	.00	.10
		SD	.49	.00	.31
13	2	M	.00	.05	.10
		SD	.00	.22	.31
14 ^b	1 ^b	M	.10	.10	.10
		SD	.45	.45	.31

^aDiscriminative stimuli for approach.

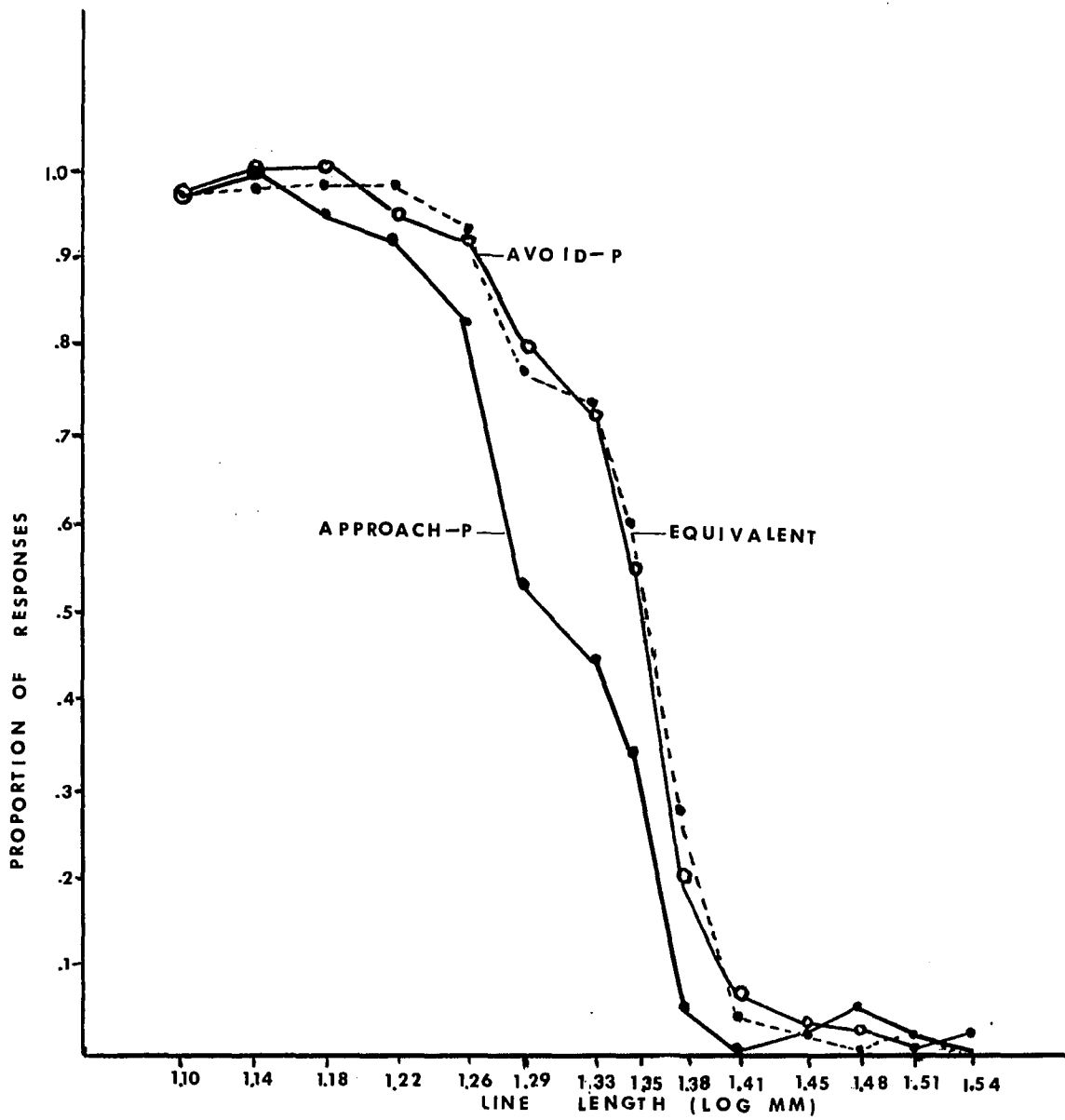
^bDiscriminative stimuli for avoidance.

There was a tendency for subjects to make more approach generalization responses when avoidance was either a left sided response to discriminative stimulus 14, or a right sided response to discriminative stimulus 1. This interaction was not statistically significant. Any similar interactions, however, do not significantly affect our major findings of differences among groups since our methodology controlled for these confoundings by counterbalancing both the response side and discriminative stimulus of the avoidance responses for all three groups.

Between groups comparisons of the two choice avoidance generalization responses. These generalization gradients are the complements of the two choice approach generalization gradients since there is a fixed total of six responses per stimulus. For example, if the total number of two choice approach generalization responses to line 7 is 2, then there are a total of 4 avoidance generalization responses made to line 7. Hence, the analysis of variance is exactly the same as the analysis for the approach responses; and the means are "six minus the means for the approach responses."

Between groups comparisons of slope and criterion - two choice avoidance generalization responses. In order to interpret differences in generalization gradients with respect to the distribution of responses, a detailed analysis involving the investigation of variations in both slope and criterion was utilized (Swets, Tanner, and Birdsall, 1961). To do this analysis, each of the major groups (Approach-P, Avoidance-P, and Equivalent groups) was sub-divided into those subjects that had line 1 and those subjects that had line 14 as the discriminative stimulus for avoidance. Figure 4 (group data) represents the gradients for the two choice avoidance responses of those subjects that had line 1 as the discriminative stimulus for avoidance. As can be observed, the criteria of the Avoidance-P and Equivalent groups occur at points in the stimulus continuum that are further removed from the discriminative stimulus for avoidance (log line 1.10 mm) than is the criterion of the Approach-P group. Contrasted to the Approach-P group, the criteria for the Avoidance-P and Equivalent groups are shifted more in the direction of the discriminative stimulus for approach (log line 1.54 mm).

Figure 4 Avoidance generalization gradients: two
choice (Line log 1.10 mm is S^D for
avoidance).



In order to analyze group differences, for each subject, the proportions associated with the changing part of his generalization gradient was converted to z scores and a straight line was fitted to these points by the method of least squares. Since only six judgments were made for each stimulus, the following convention was adopted. All proportions of zero and one were dropped except those surrounding the changing part of the function. A proportion of zero was arbitrarily assigned a z-score of minus three; and a proportion of one, a z-score of plus three. Table 5 contains the mean slope and criterion for each of the three groups. The differences in slope are not statistically significant (see Table 6 in Appendix); whereas, the differences in criterion are ($p < .05$, see Table 7).

Figure 5 (group data) contains the gradients for the two choice avoidance gradients for those subjects that had line 14 as the discriminative stimulus for avoidance. It appears that the criteria of the Avoidance-P group and the Equivalent group occur at points in the stimulus continuum that are relatively

TABLE 5

Mean Slope and Criterion for Two Choice Avoidance Responses
(Line 1 is S^D for Avoidance)

Group	Slope	Criterion
Approach-P	44.23 ^a	Log 1.30 mm
Avoidance-P	48.97	Log 1.34 mm
Equivalent	44.56	Log 1.35 mm

^aExpressed in units of z-score per log mm.

TABLE 7

Between Groups Analysis of Variance of the Criterion of
the Two Choice Avoidance Generalization Responses (Line 1
is S^D for Avoidance)

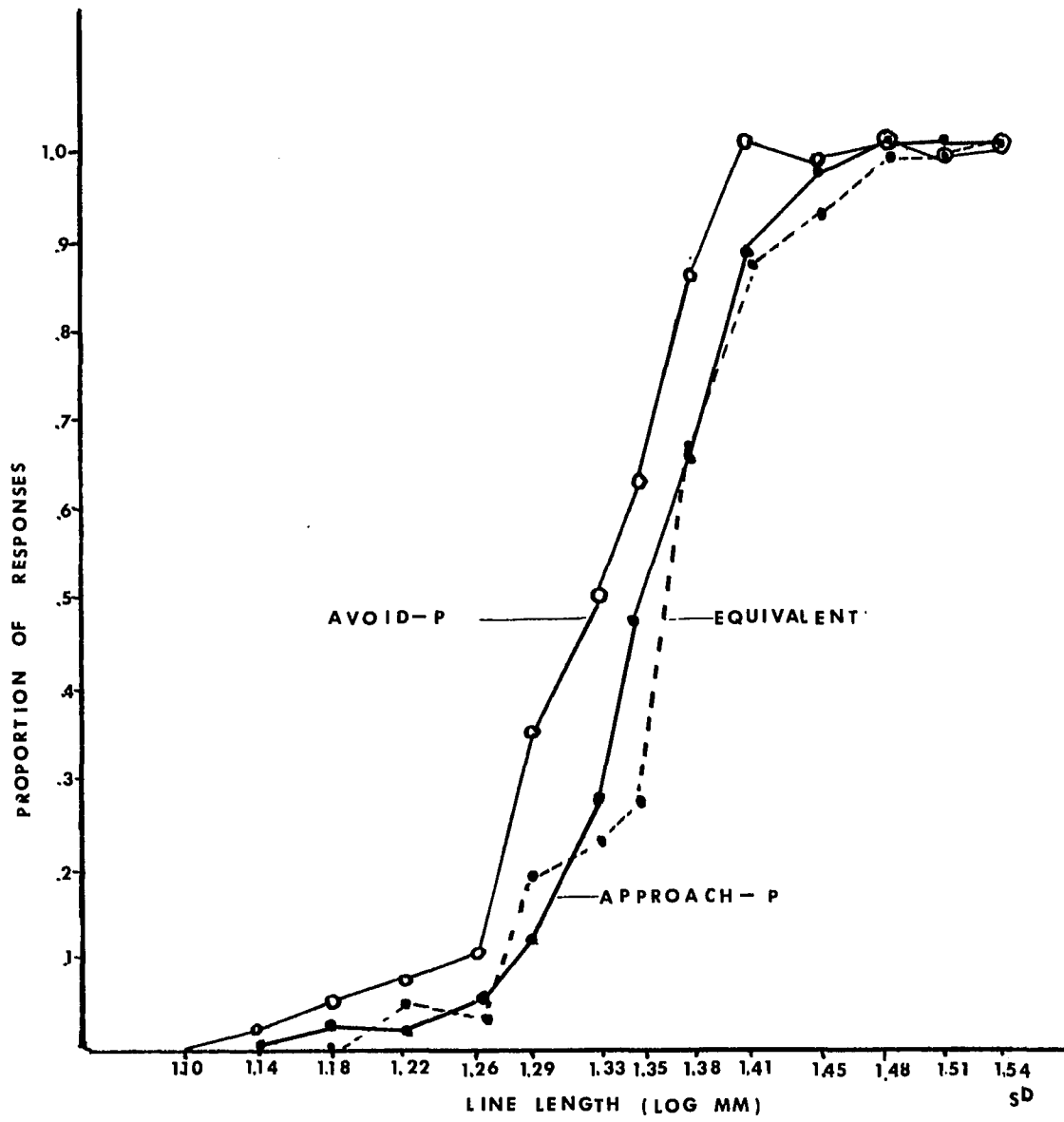
Source	df	MS	F
Groups (A) ^a	2	.0055	4.58*
Response Side (B) ^b	1	.0014	1.17
Groups x Side (A X B)	2	.0015	1.25
Within Treatments	24	.0012	
Total	29		

^aApproach-P, Avoidance-P, or Equivalent Groups.

^bRight or left side for avoidance responses.

*p<.05

Figure 5 Avoidance generalization gradients: two
choice (Line log 1.54 mm is S^D for
avoidance).



further removed from the discriminative stimulus for avoidance (log line 1.54 mm) than the criterion of the Approach-P group. Table 8 contains the mean slope and criterion for each of the three groups (based on individual data). Neither the differences in slope or criterion is statistically significant (see Tables 9 and 10 in Appendix).

Within groups comparisons of two choice approach and avoidance generalization responses. To date, the type of slope and criterion analysis previously presented, unfortunately, has not been applied to investigations of approach and avoidance stimulus generalization gradients. Consequently, information obtained from these sophisticated between groups analyses is not directly comparable to the graphic within groups interpretations of steepness utilized, in varying degrees, by Miller, Hearst, Hoffman and Fleshler. Since the primary purpose of this study is to investigate their findings, direct comparisons must be made between their findings and ours. To do this, their methods of gradient analysis must be utilized also. Figure 6 contains the two choice approach and avoidance generalization gradients of the Approach-P group. The Approach-P group made more approach responses than avoidance responses. The greatest differences

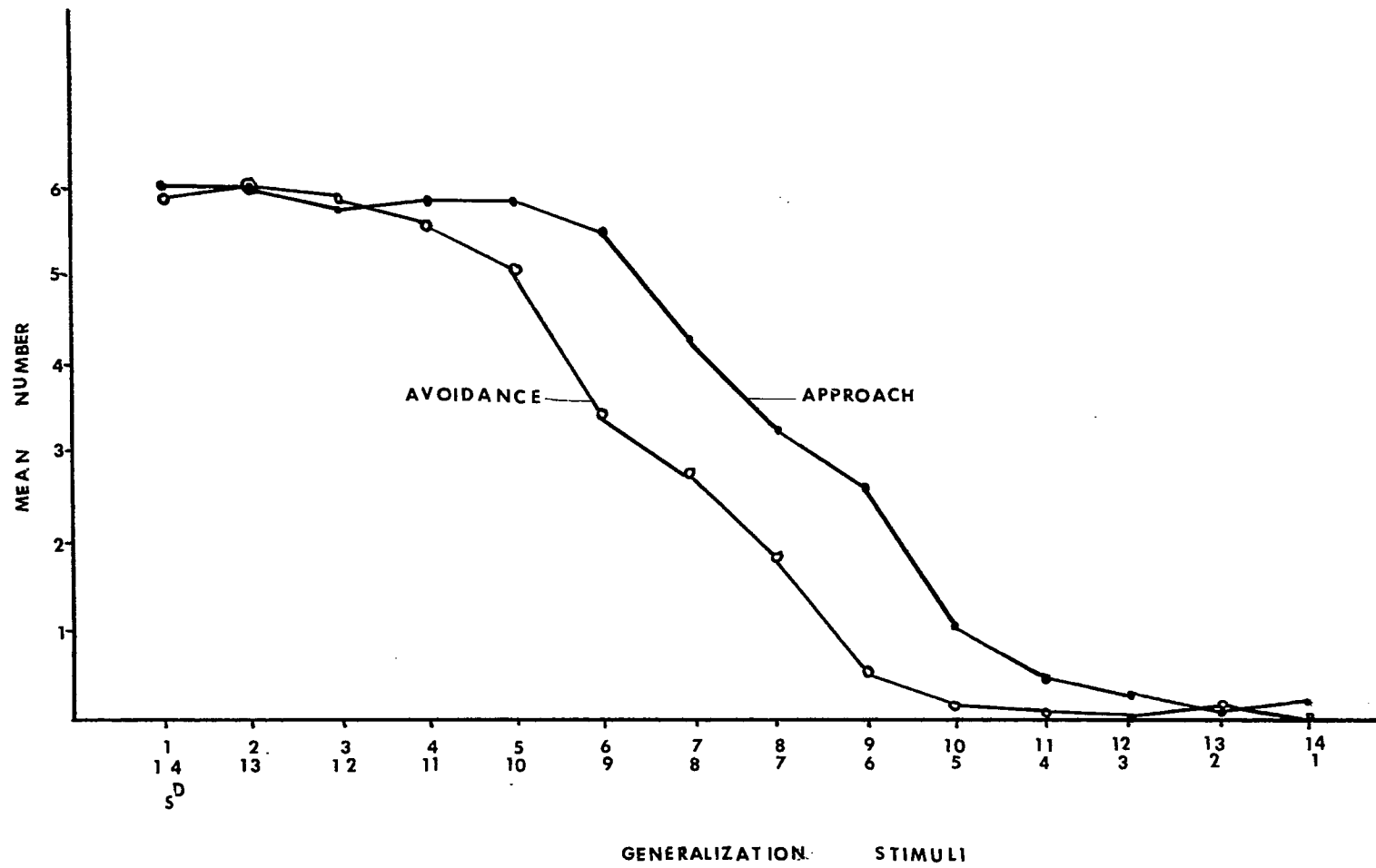
TABLE 8

Mean Slope and Criterion for Two Choice Avoidance Responses
(Line 14 is s^D for Avoidance)

Group	Slope	Criterion
Approach-P	38.55 ^a	Log 1.35 mm
Avoidance-P	42.83	Log 1.32 mm
Equivalent	42.98	Log 1.36 mm

^aExpressed in units of z -score per log mm.

Figure 6 **Approach-P group: approach and avoidance
gradients -- two choice data.**



in the mean number of approach and avoidance generalization responses occur in the middle of the range of generalization stimuli, with few differences occurring to the two end stimuli—the discriminative stimuli for approach and avoidance. The avoidance gradient appears to be steeper than the approach gradient: at four units away from the discriminative stimuli for approach and avoidance, the Approach-P group emitted approach and avoidance responses at about the same rate: over 80% of the time; whereas, at five units away from the discriminative stimuli for avoidance, the rate of avoidance responses dropped to less than 60%. As can be seen in Table 11, both the differences in number and distribution of responses (Stimuli by Conditions interaction, see Hoffman and Fleshler, 1963) were statistically significant ($p < .01$).

Figure 7 contains the two choice approach and avoidance generalization gradients of the Avoidance-P group. In contrast to the Approach-P group, the Avoidance-P group made more avoidance responses than approach responses. As in the Approach-P group, the greatest differences in mean

TABLE 11

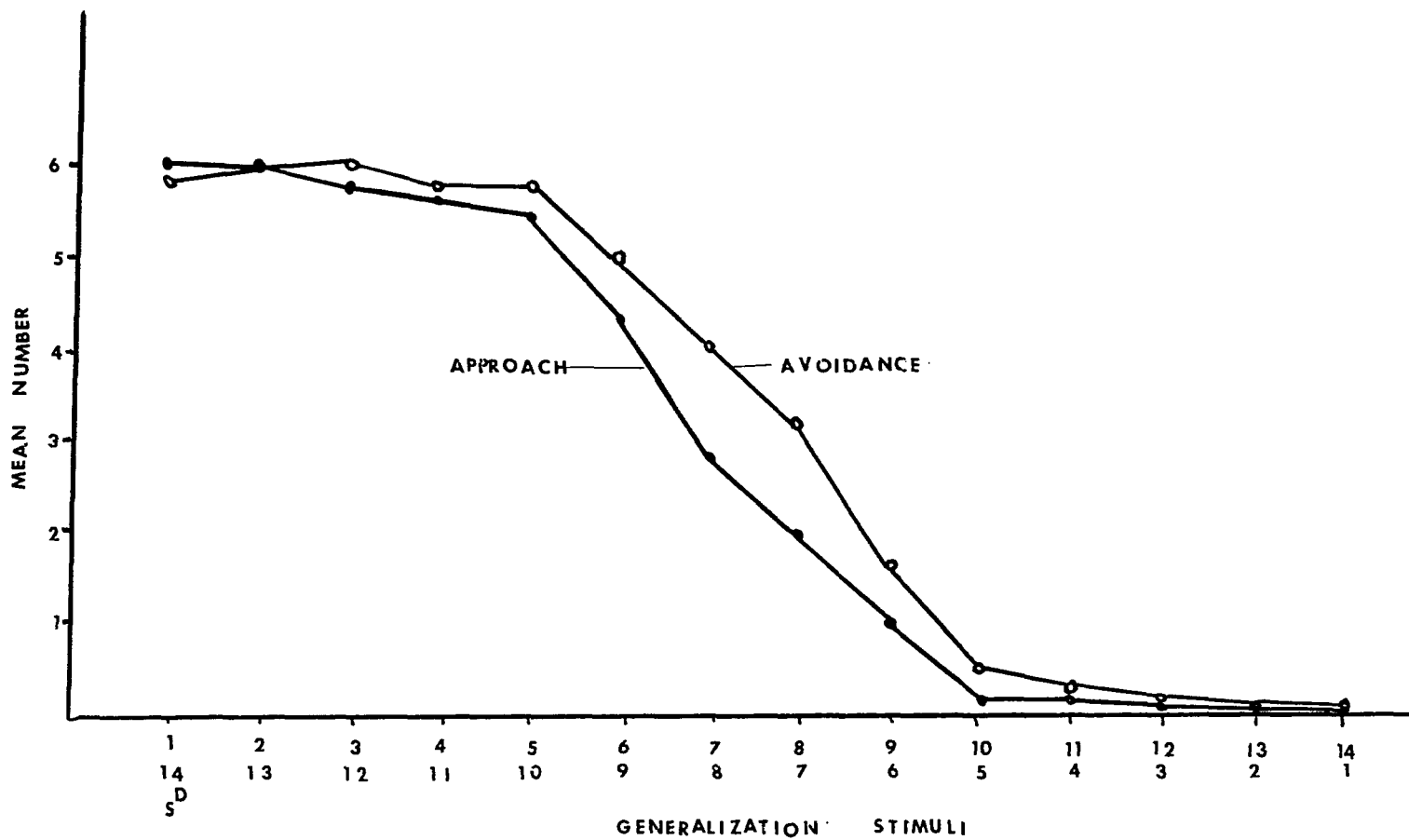
Approach-P Group: Within Group Analysis of Variance of the
Two Choice Approach and Avoidance Generalization Gradients

Source	df	MS	F
Response Type (A) ^a	1	59.00	16.71**
Error (a)	38	3.53	
Test Stimuli (B)	13	256.14	233.61**
Response Type x Stimuli	13	6.85	6.23**
Error (b)	494	1.10	
Total	559		

^aApproach or avoidance responses.

**p < .01

**Figure 7 Avoidance-P group: approach and avoidance
gradients — two choice data.**



number of approach and avoidance generalization responses occur in the middle of the range of generalization stimuli, with few differences occurring to the two end stimuli- the discriminative stimuli for approach and avoidance. The approach gradient appears to be steeper than the avoidance gradient. The differences between number and distribution of approach and avoidance responses were both statistically significant beyond the .05 level of confidence (see Table 12).

Figure 8 contains the two choice approach and avoidance generalization gradients of the Equivalent group. There appears to be a consistent tendency to make slightly more approach responses than avoidance responses throughout the entire range of generalization stimuli. Neither the differences between number of responses, or distribution of responses, is statistically significant (see Table 13).

TABLE 12

Avoidance-P Group: Within Group Analysis of Variance of
the Two Choice Approach and Avoidance Generalization
Gradients

Source	df	MS	F
Response Type (A) ^a	1	16.00	4.64*
Error (a)	38	3.45	
Test Stimuli (B)	13	264.77	290.96**
Response Type x Stimuli	13	2.00	2.20*
Error (b)	494	.91	
Total	559		

^aApproach or avoidance responses.

*p < .05

**p < .01

Figure 8 Equivalent group: approach and avoidance
gradients — two choice data.

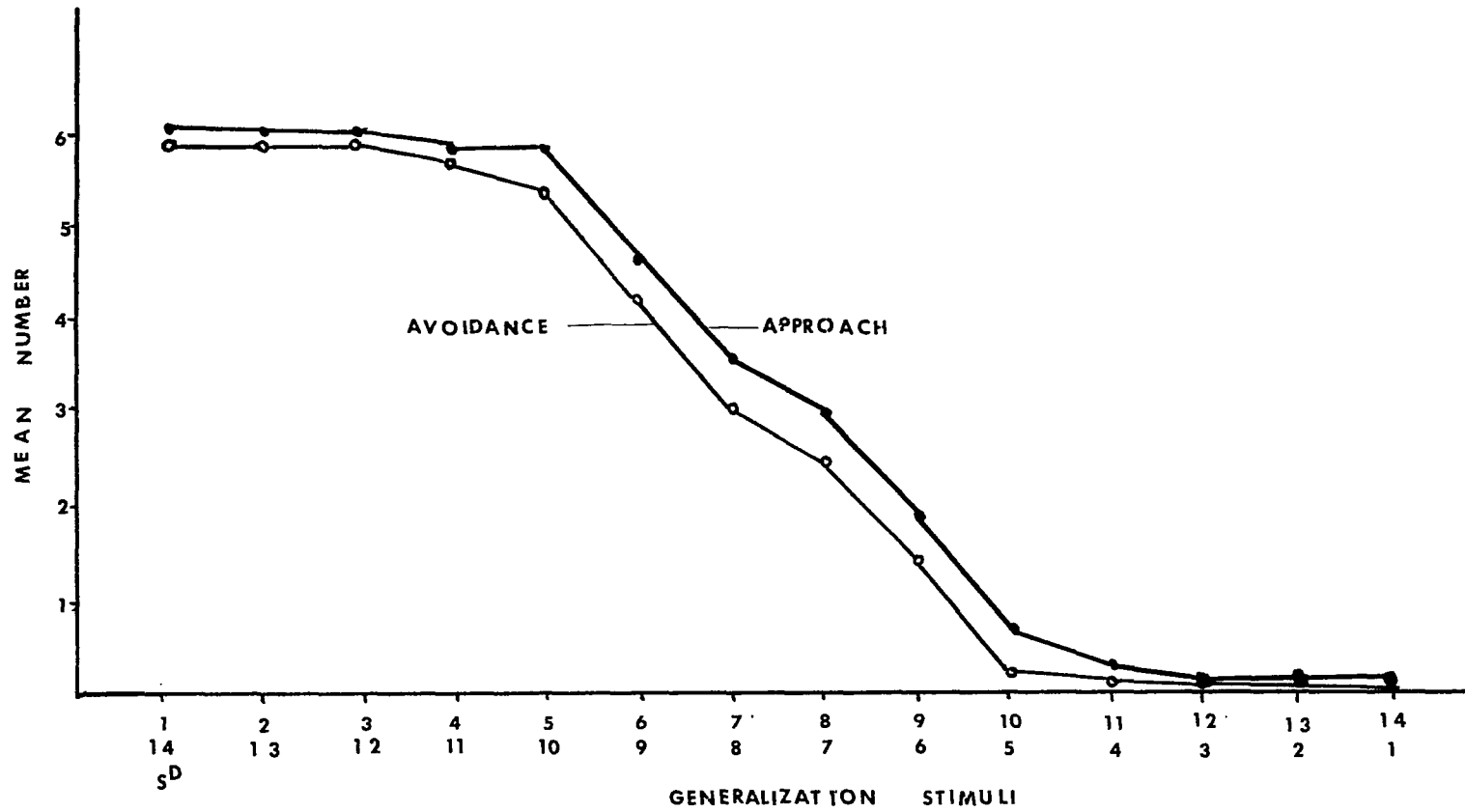


TABLE 13

Equivalent Group: Within Group Analysis of Variance of the
Two Choice Approach and Avoidance Generalization Gradients

Source	df	MS	F
Response Type (A) ^a	1	8.00	1.49
Error (a)	38	5.37	
Test Stimuli (B)	13	261.23	401.89**
Response Type x Stimuli	13	.31	.48
Error (b)	494	.65	
Total	559		

^aApproach or avoidance responses.

**p<.01

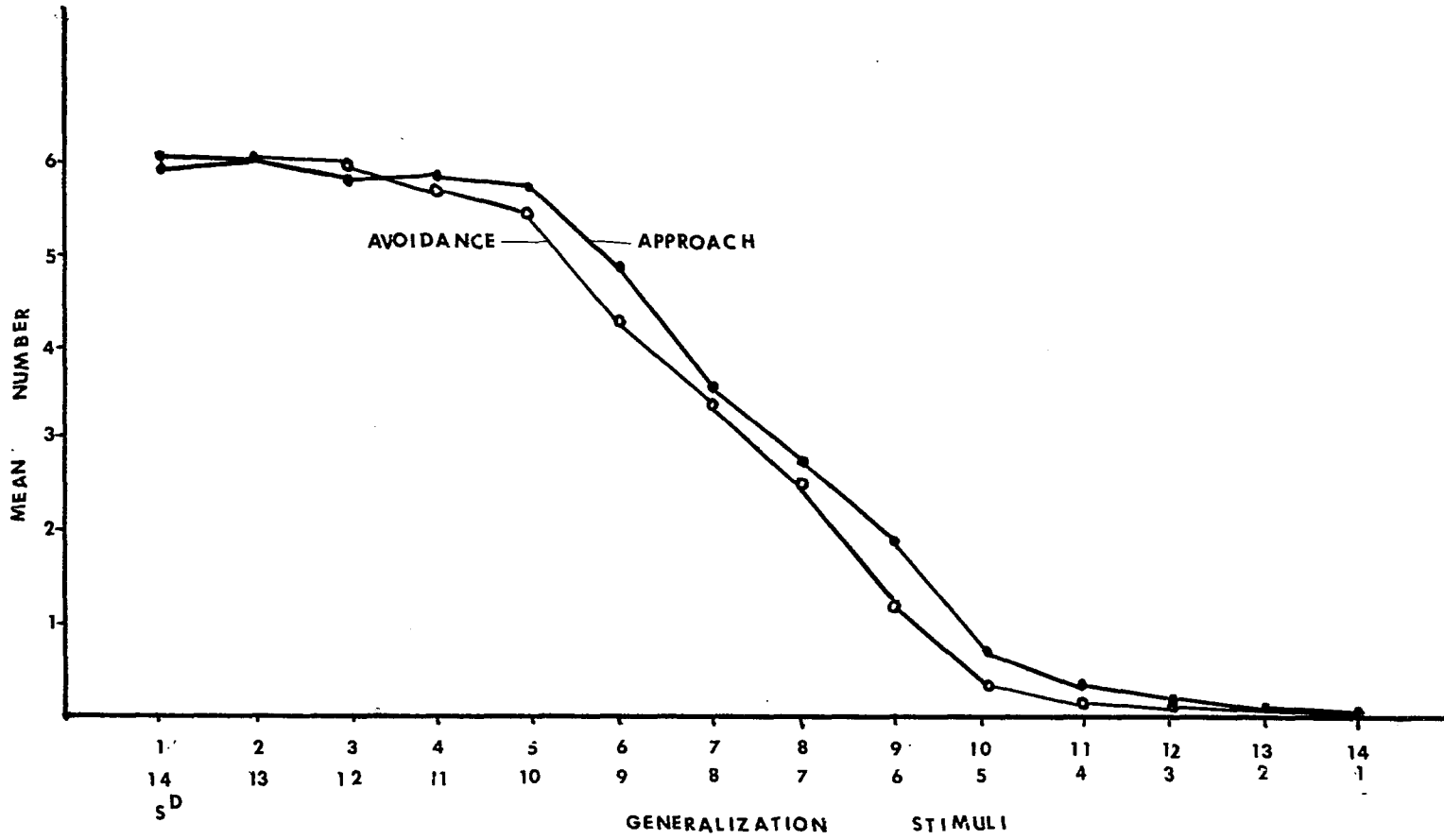
As an interesting a posteriori control for response strength differences, two choice approach and avoidance generalization gradients were constructed without regard to group placement. The two choice approach data of the Approach-P, Avoidance-P, and Equivalent groups were combined, and the same procedure was followed for the two choice avoidance data. This, however, does not replicate a true random sampling of subjects since subjects were selected with a matching procedure. The criterion of ± 20 milliseconds that was utilized in our study for group placement reflects a relative selection along some "unknown" range in what may be an absolute scale (of approach-avoidance). The true dimensions of this scale and frequency distributions of subjects in the population are unknown to us. Using our criterion, the distribution of response tendencies to approach and avoidance stimuli does not appear to be equally distributed in the population since a random selection of subjects, using symmetrical pay-offs, did not yield equally subjects for the Approach-P, Avoidance-P, and Equivalent groups as might be expected. It should

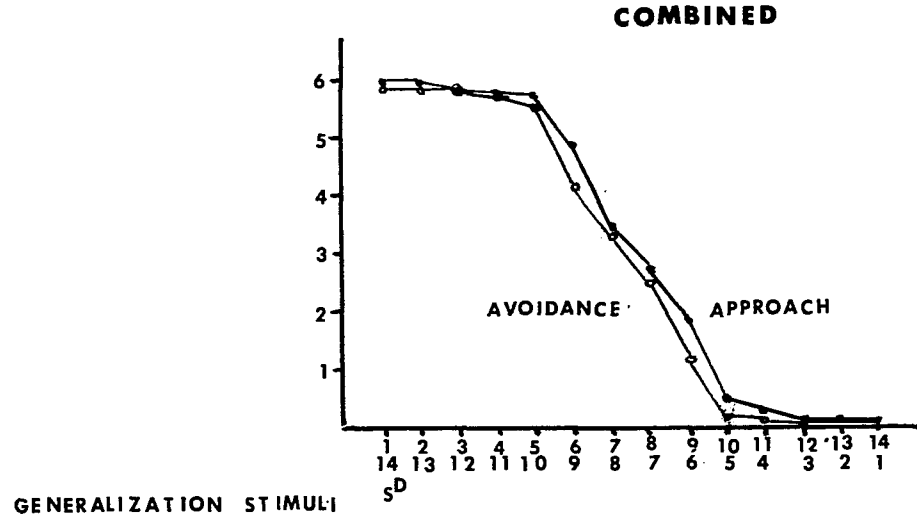
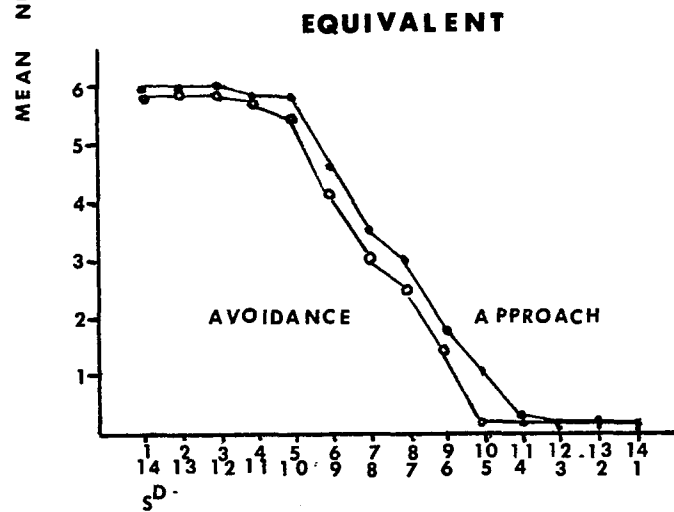
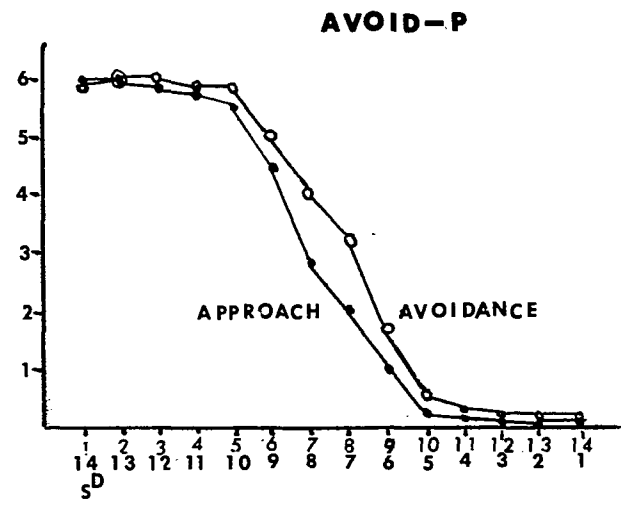
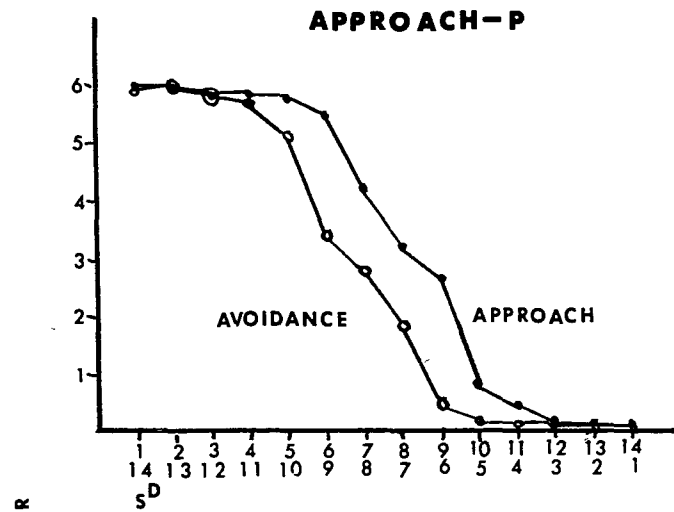
also be noted that all subjects did not have the same set of instructions, as instructions were modified to distribute the subjects equally to the different conditions (different discriminative stimuli for avoidance and different response sides for avoidance).

Figure 9 represents the generalization gradients that were generated by collapsing the groups. Overall, there is a marked tendency for subjects to make more approach than avoidance responses. This finding suggests that group allocations may have been imbalanced in favor of the Approach-P group. However, the differences between the combined approach and combined avoidance generalization gradients are not statistically significant ($t = 2.03$, 13 df).

For ease of presentation, a summary of the comparisons of the two choice approach and avoidance generalization gradients within the Approach-P, Avoidance-P, Equivalent, and Combined groups appears in Figure 10. As can be observed, the form of the gradients is consistent with the subject's pregeneralization response tendencies (group placement).

Figure 9 Combined Approach-P, Avoidance-P, and
Equivalent groups: approach and avoidance
gradients -- two choice data.





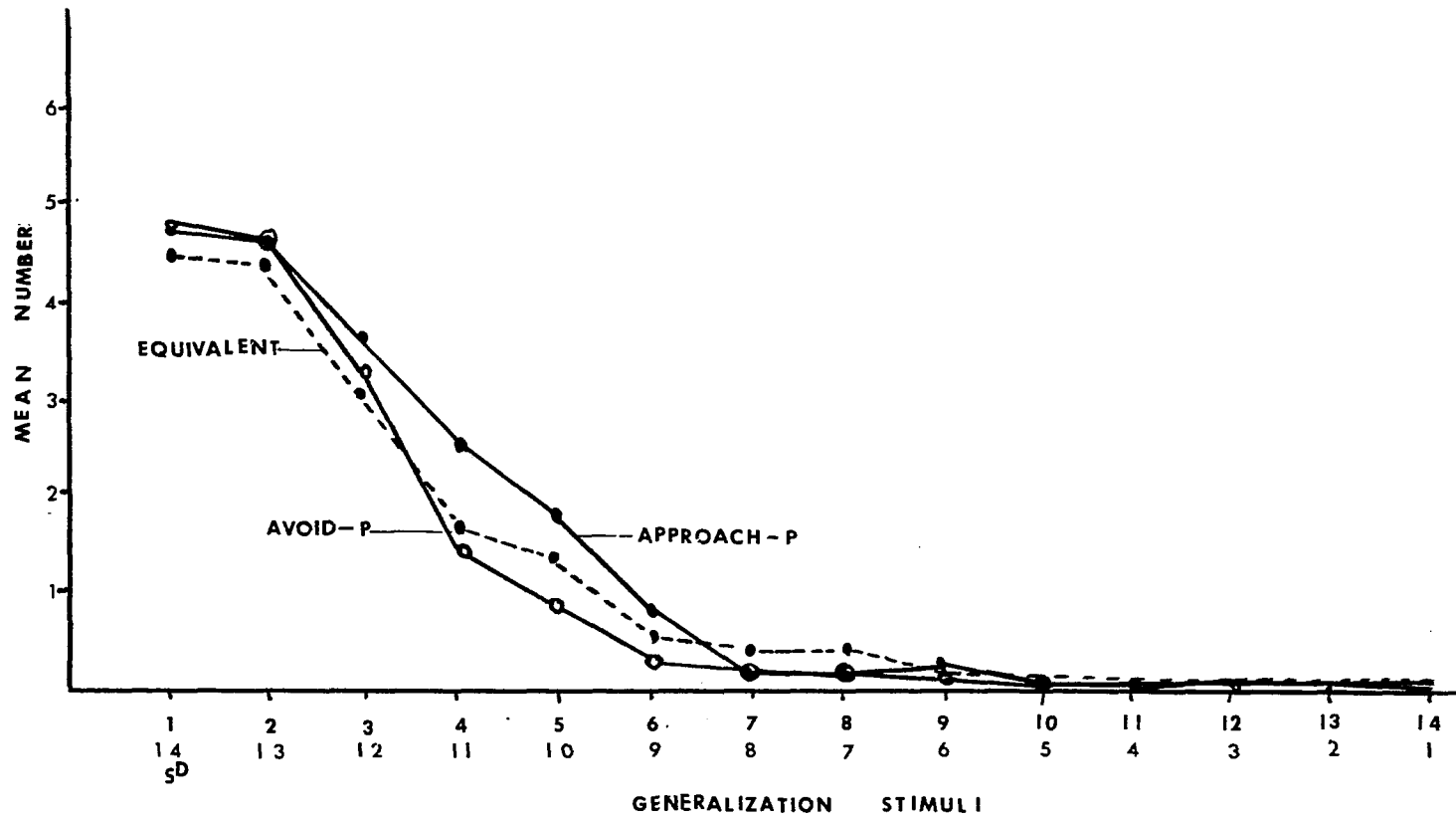
GENERALIZATION STIMULI

Part II

Between groups comparisons of three choice approach generalization responses. This analysis is concerned only with the three choice, or spontaneous, approach generalization responses of the Approach-P, Avoidance-P, and Equivalent groups. Since neither of the Fs for the main effects of Response Side or Discriminative Stimuli were statistically significant (see Table 14 in Appendix), these categories were collapsed for the analysis of the relationship between pregeneralization response strength and the form of the three choice approach generalization gradients.

As can be seen in Figure 11, where differences do occur among groups, the Approach-P group made more approach responses than either the Avoidance-P or Equivalent groups, with the Avoidance-P making the fewest. The greatest differences in mean number of approach generalization responses appear to be in the range of generalization stimuli three to five units removed from the discriminative stimuli for approach, with almost

**Figure 11 Approach generalization responses: three
choice data.**



perfect discrimination made to the two end stimuli, lines 1 and 14 — the discriminative stimuli for approach. Very few differences in responding are observed among groups with respect to the discriminative stimuli for approach and the generalization stimuli two units away. For all groups, approach responses were emitted to these stimuli more than 50% of the time. The greatest gap among groups seems to occur at the generalization stimuli three units removed from the discriminative stimuli for approach. To these stimuli, the Approach-P and Equivalent groups made approach responses around 25% of the time. Table 15 contains the means of the three choice approach generalization responses for each of the three groups. The differences are not statistically significant (see Table 14 in Appendix).

Between groups comparisons of three choice avoidance generalization responses. This analysis is concerned only with the three choice, spontaneous avoidance generalization responses made by each of the three major

TABLE 15

Mean Number of Three Choice Approach Generalization
Responses to Six Presentations of Each of the 14
Stimuli

Stimuli			Approach-P	Avoidance-P	Equivalent
1 ^a	14 ^a	M	6.00	5.95	5.95
		SD	.00	.22	.22
2	13	M	5.95	5.95	6.00
		SD	.22	.22	.00
3	12	M	5.80	5.75	6.00
		SD	.70	.44	.00
4	11	M	5.90	5.70	5.80
		SD	.31	.57	.41
5	10	M	5.85	5.50	5.80
		SD	.37	.83	.52
6	9	M	5.50	4.35	4.65
		SD	1.00	1.87	1.46
7	8	M	4.20	2.85	3.50
		SD	1.85	2.11	2.21
8	7	M	3.25	1.95	3.00
		SD	1.65	1.60	2.32
9	6	M	2.60	1.05	1.75
		SD	2.30	1.47	1.94
10	5	M	.90	.25	.60
		SD	1.48	.55	1.14
11	4	M	.35	.20	.30
		SD	.75	.52	.57
12	3	M	.15	.00	.10
		SD	.49	.00	.31
13	1	M	.00	.05	.10
		SD	.00	.22	.31
14 ^b	1 ^b	M	.10	.10	.10
		SD	.45	.45	.31

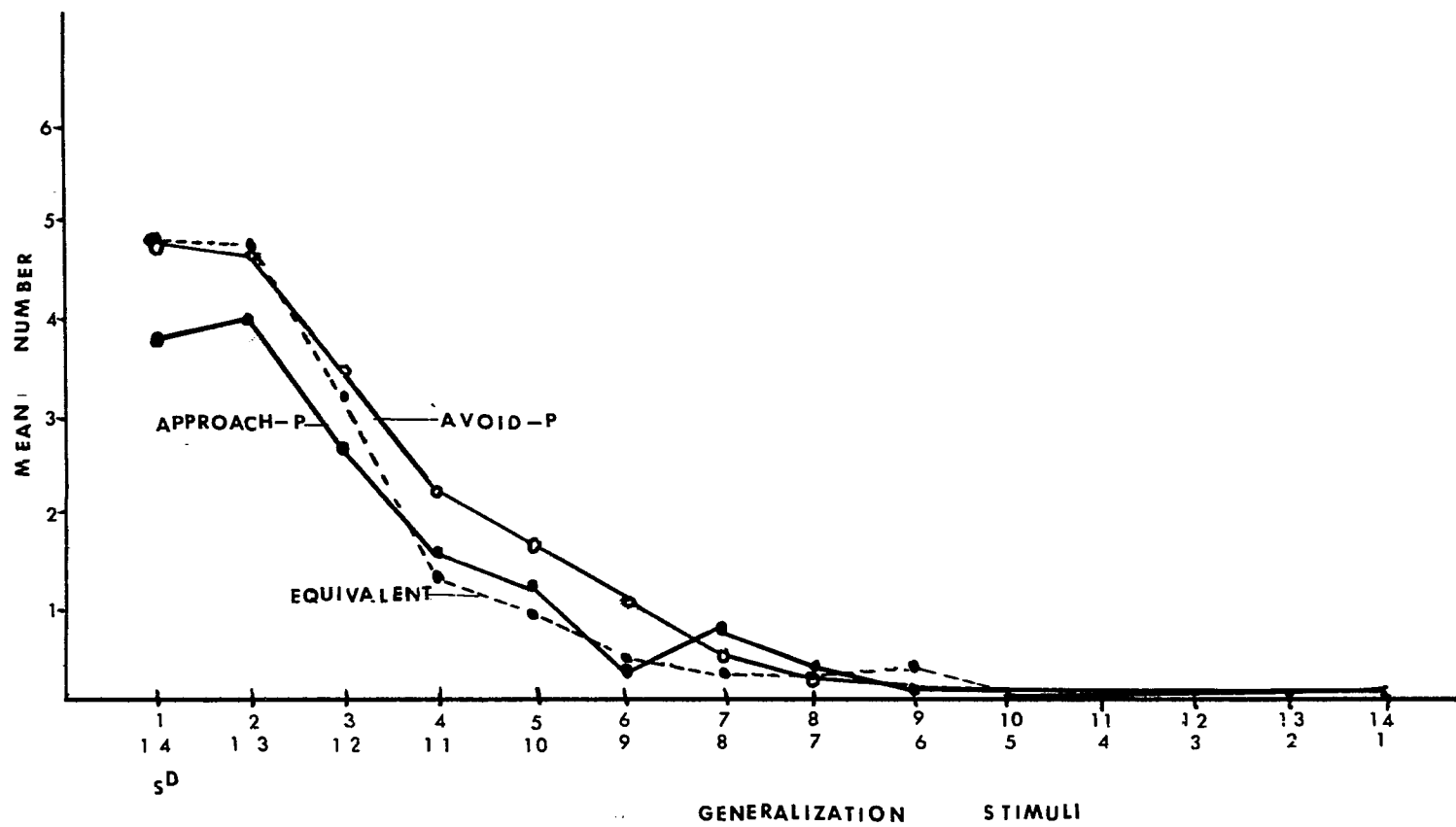
^aDiscriminative stimuli for approach.

^bDiscriminative stimuli for avoidance.

groups. Here too, since neither of the Fs for the main effects of Response Side or Discriminative Stimuli were significant, these categories were collapsed for the analysis of the relationship between pregeneralization response strength and the form of avoidance generalization gradients (see Table 16 in Appendix).

As can be seen in Figure 12, where differences do occur among groups, the Avoidance-P group made more avoidance responses than either the Approach-P or Equivalent groups, with the Approach-P group making the fewest. There is a consistent difference between the avoidance responses of the Approach-P and Avoidance-P group, starting at the discriminative stimuli for avoidance to those test stimuli five units removed in the direction of the discriminative stimuli for approach. The Equivalent group initially, at the discriminative stimuli for avoidance, makes more avoidance responses than the Avoidance-P group; however, at the generalization stimuli three and four units removed, the Equivalent group makes less avoidance responses than either the Avoidance-P or

Figure 12 Avoidance generalization responses:
three choice data



Approach-P group. Table 17 contains the means of the three choice avoidance responses for the Approach-P, Avoidance-P, and Equivalent groups. The differences observed in both Figure 12 and Table 17 are not statistically significant (see Table 16 in Appendix).

Between groups comparisons of slopes and criteria for the three choice approach generalization gradients.

In order to interpret differences in the three choice generalization gradients, with reference to the distribution of responses, a detailed analysis involving the investigation of slope and criterion was utilized (for specific details concerning the method of analysis see Part I of the Results section). Each of the major groups was subdivided into those subjects that had line log 1.10 mm and those that had line log 1.54 mm as the discriminative stimulus for avoidance. Figure 13 (group data) represents the three choice approach gradients for those subjects that had line log 1.10 mm as the discriminative stimulus for avoidance. As can be

TABLE 17

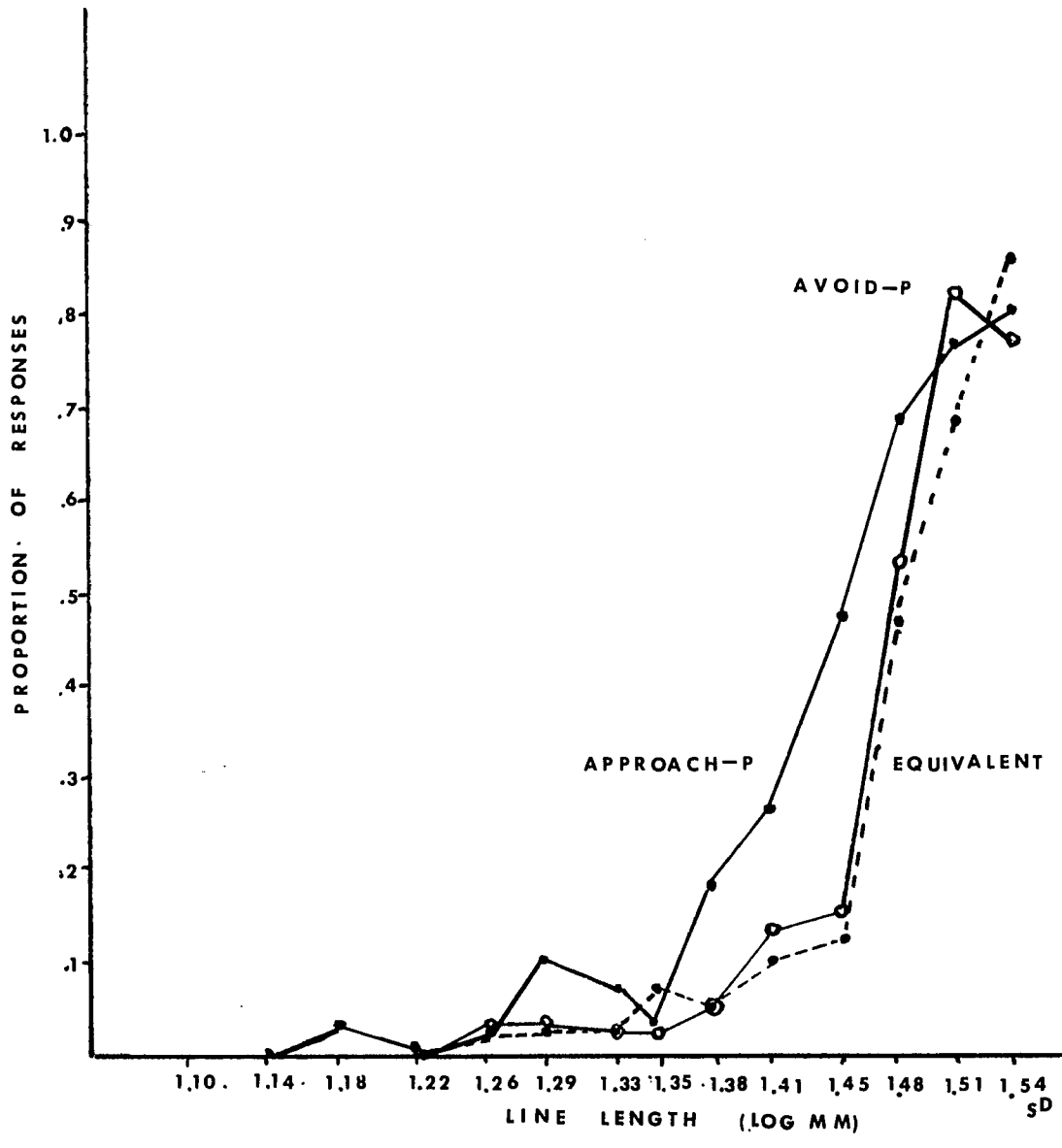
Mean Number of Three Choice Avoidance Generalization
Responses to Six Presentations of Each of the 14
Stimuli

Stimuli			Approach-P	Avoidance-P	Equivalent
1 ^a	14 ^a	M	3.75	4.85	4.80
		SD	2.02	1.39	1.77
2	13	M	3.95	4.70	4.75
		SD	1.28	1.30	1.70
3	12	M	2.60	3.35	3.15
		SD	1.27	1.31	1.53
4	11	M	1.50	2.05	1.30
		SD	1.54	1.47	1.03
5	10	M	1.25	1.55	.90
		SD	1.48	1.64	1.33
6	9	M	.30	.95	.45
		SD	.66	1.05	1.00
7	8	M	.70	.35	.30
		SD	.92	.32	.66
8	7	M	.30	.25	.15
		SD	.73	.55	.49
9	6	M	.05	.10	.05
		SD	.22	.31	.22
10	5	M	.00	.05	.00
		SD	.00	.22	.00
11	4	M	.00	.00	.05
		SD	.00	.00	.22
12	3	M	.05	.05	.00
		SD	.22	.22	.00
13	2	M	.00	.00	.00
		SD	.00	.00	.00
14 ^b	1 ^b	M	.00	.00	.05
		SD	.00	.00	.22

^aDiscriminative stimuli for avoidance.

^aDiscriminative stimuli for approach.

Figure 13 Approach generalization gradients: three choice (Line log 1.10 mm is S^D for avoidance).



observed, the criterion of the Approach-P group occurs at a point in the stimulus continuum that is further removed from the discriminative stimulus for approach (line log 1.54 mm) than are the criteria of the Avoidance-P and Equivalent groups. Contrasted to the Avoidance-P and Equivalent groups, the criterion of the Approach-P group is shifted more in the direction of the discriminative stimulus for avoidance (line log 1.10 mm). Table 18 contains the mean slope and criterion of each of the three groups. Neither the differences in slopes nor criteria was statistically significant (see Tables 19 and 20 in the Appendix).

Figure 14 (group data) represents the three choice approach gradients for those subjects that had line log 1.54 mm as the discriminative stimulus for avoidance. As can be observed, there are few differences in criteria among the three groups, and the differences are small. Table 21 contains the mean slope and criterion for each of the three groups. Neither the differences in slopes nor criteria is statistically significant (see Tables 22 and 23 in Appendix).

TABLE 18

Mean Slope and Criterion for Three Choice Approach
Responses (Line 1 is S^D for Avoidance)

Group	Slope	Criterion
Approach-P	30.6 ^a	1.35
Avoidance-P	23.3	1.51
Equivalent	32.9	1.49

^aExpressed in z-score units per log mm.

Figure 14 Approach generalization gradients: three choice (Line log 1.54 mm is S^D for avoidance).

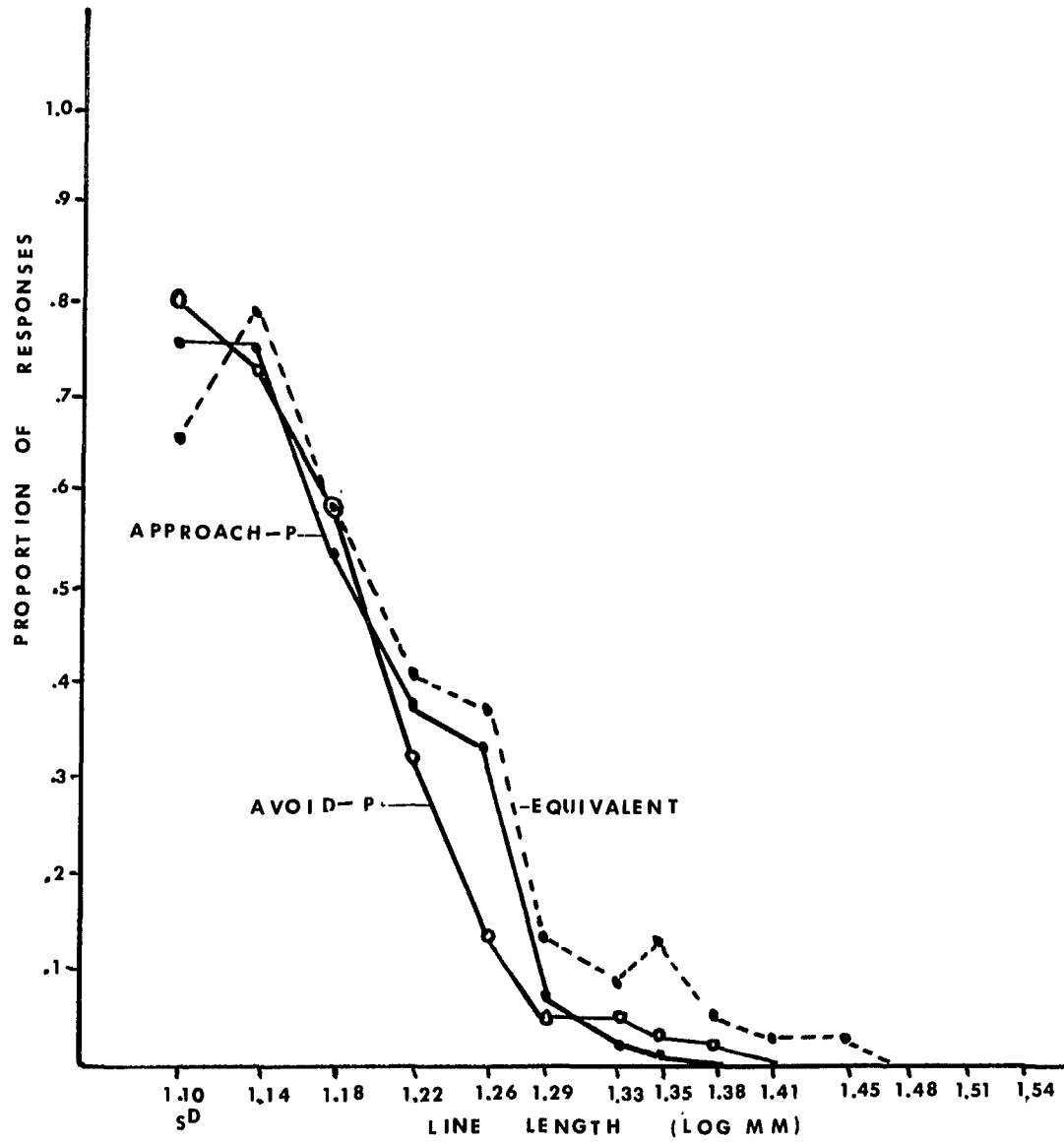


TABLE 21

Mean Slope and Criterion for Three Choice Approach
Responses (Line 14 is S^D for Avoidance)

Group	Slope	Criterion
Approach-P	21.7 ^a	1.18
Avoidance-P	24.5	1.18
Equivalent	26.0	1.20

^aExpressed in units of z-score per log mm.

Between groups comparisons of slopes and criteria for the three choice avoidance generalization gradients. Figure 15 (group data) represents the three choice avoidance gradients for those subjects that had line log 1.10 mm as the discriminative stimulus for avoidance. Table 24 contains the mean slope and criterion for each of the three groups. Neither the differences in slopes nor criteria was statistically significant (see Tables 25 and 26 in Appendix).

Figure 16 (group data) represents the three choice avoidance gradients for those subjects that had line log 1.54 mm as the discriminative stimulus for avoidance. Table 27 contains the mean slope and criterion for each of the three groups. Neither the differences in slopes nor criteria was statistically significant (see Tables 28 and 29 in Appendix).

Figure 15 Avoidance generalization gradients: three
choice (Line log 1.10 mm is s^D for
avoidance).

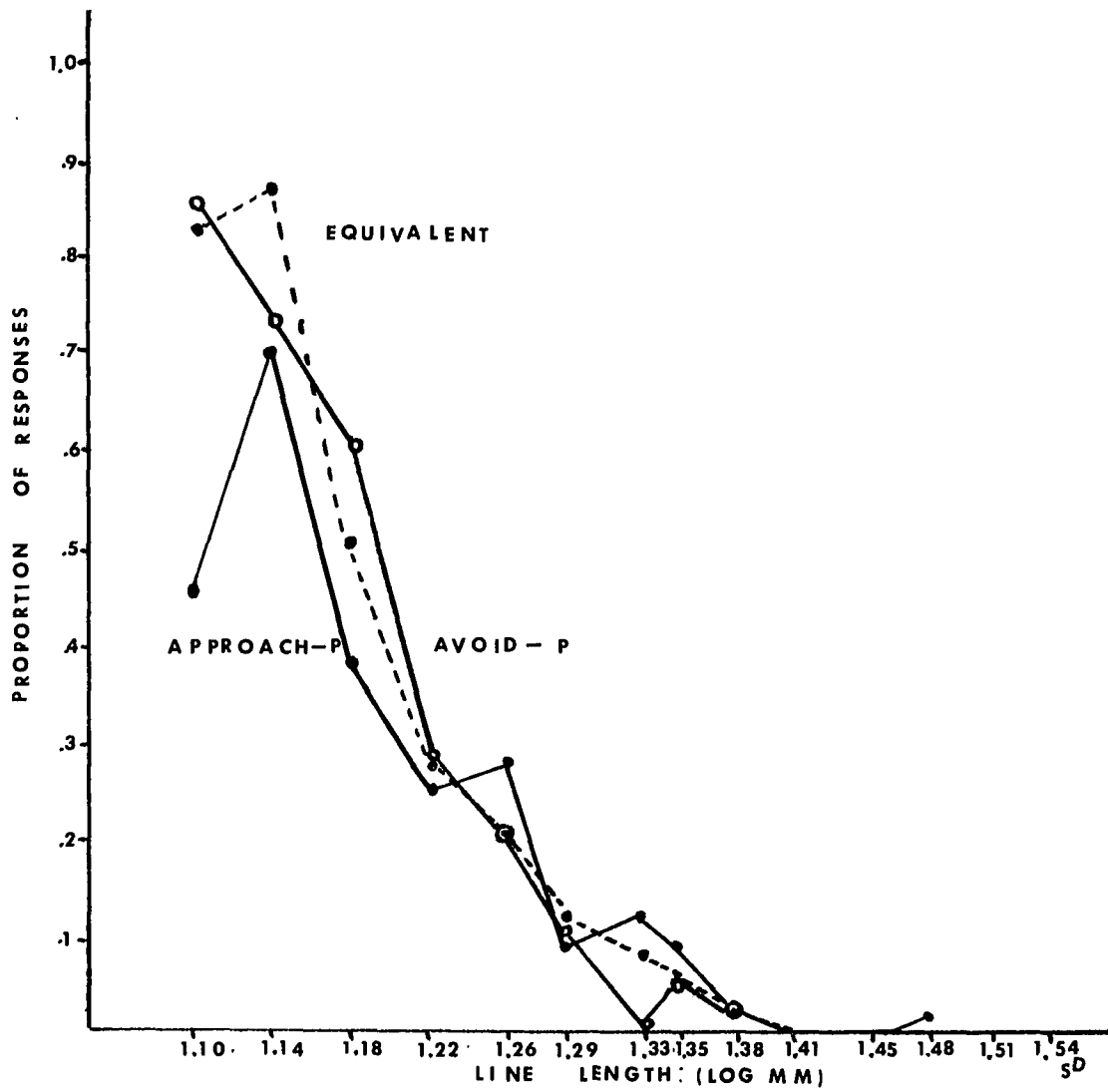


TABLE 24

Mean Slope and Criterion for Three Choice Avoidance Responses (Line 1 is s^D for Avoidance)

Group	Slope	Criterion
Approach-P	19.0 ^a	1.02
Avoidance-P	27.5	1.19
Equivalent	24.0	1.14

^aExpressed in units of \underline{z} -score per log mm.

Figure 16 Avoidance generalization gradients: three
choice (Line log 1.54 mm is S^D for
avoidance).

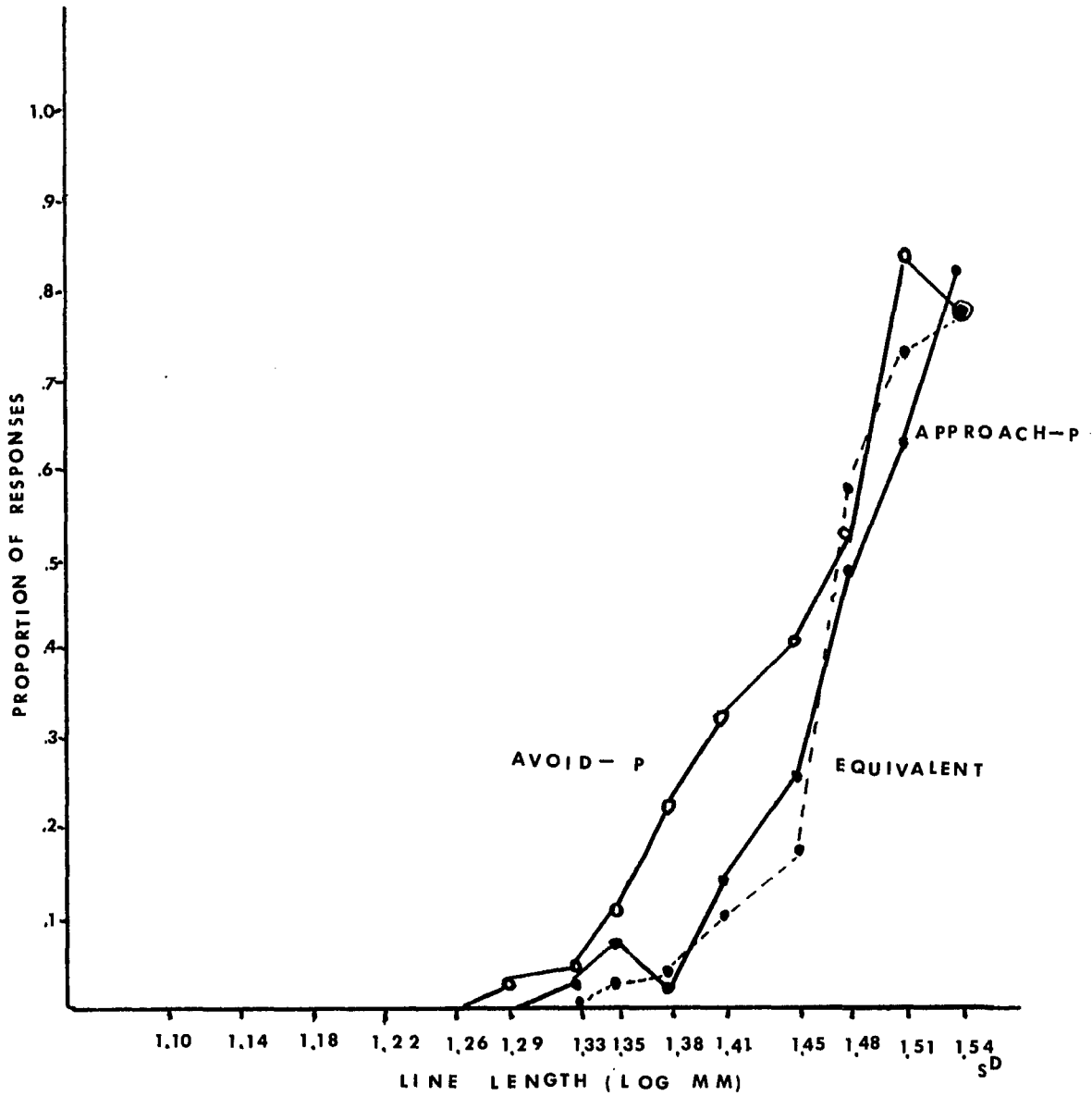


TABLE 27

Mean Slope and Criterion for Three Choice Avoidance
Responses (Line 14 is S^D for Avoidance)

Group	Slope	Criterion
Approach-P	30.9 ^a	1.49
Avoidance-P	23.0	1.46
Equivalent	28.6	1.48

^aExpressed in units of z-score per log mm.

Within groups comparisons of three choice approach and avoidance generalization responses. Figure 17 represents the three choice approach and avoidance generalization gradients of the Approach-P group. Consistently more approach responses were made to the range of stimuli located within five units from the discriminative stimuli for approach than were avoidance responses to the range of stimuli located within five units from the discriminative stimuli for avoidance. Very few approach or avoidance responses were emitted to the middle range of stimuli. As can be seen in Table 30, the differences in number was statistically significant beyond the .05 level of confidence, and the differences in distribution of responses was significant beyond the .01 level of confidence.

Figure 17 Approach-P group: approach and avoidance gradients — three choice data.

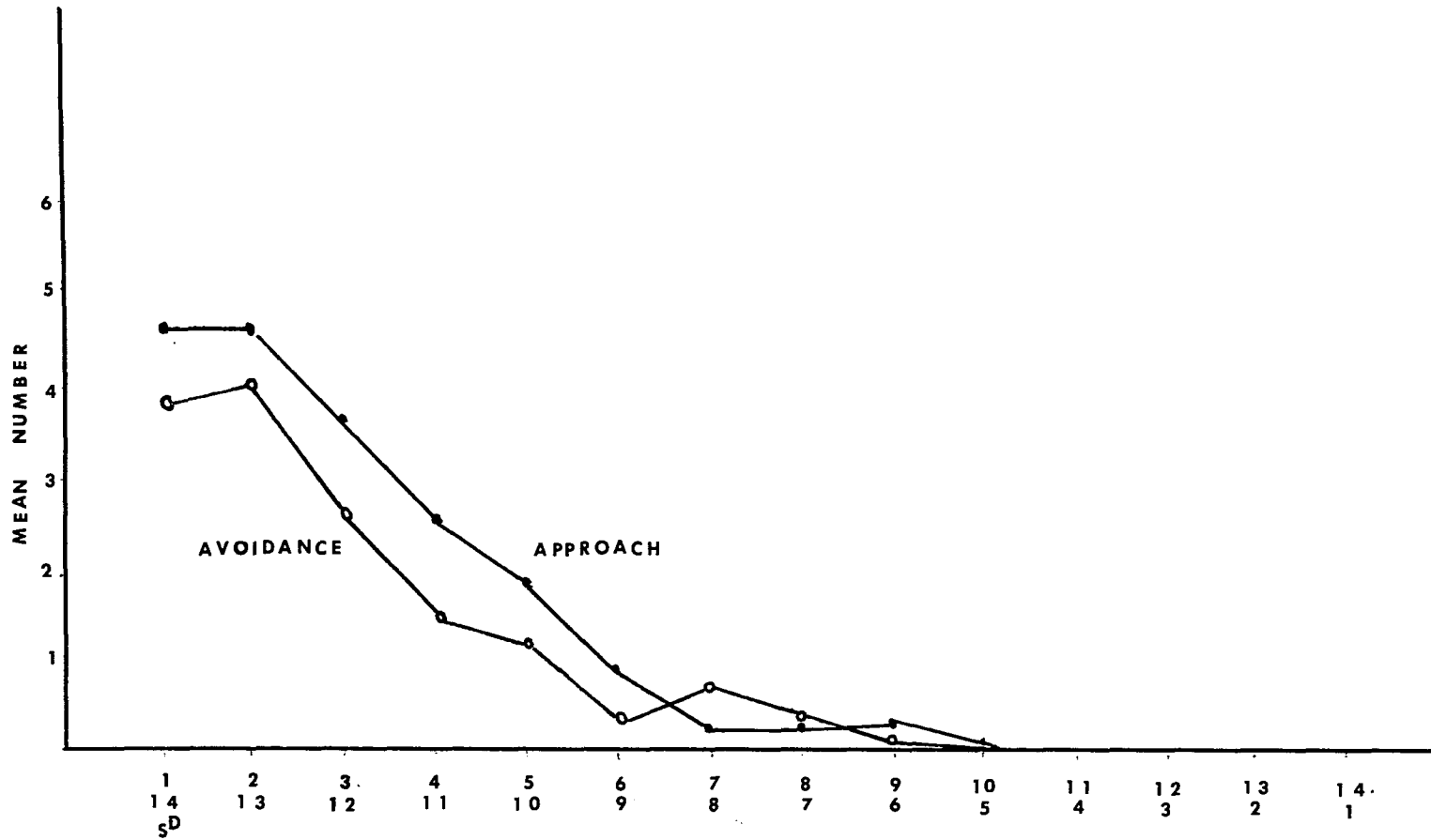


TABLE 30

Approach-P Group: Within Group Analysis of Variance of
the Three Choice Approach and Avoidance Generalization
Gradients

Source	df	MS	F
Response Type (A) ^a	1	13.00	5.48*
Error (a)	38	2.37	
Test Stimuli (B)	13	100.69	103.80**
Response Type x Stimuli	13	2.23	2.30**
Error (b)	494	.97	
Total	559		

^aApproach or avoidance responses.

*p<.05

**p<.01

Figure 18 represents the three choice approach and avoidance generalization gradients of the Avoidance-P group. The Avoidance-P group made more avoidance responses than approach responses (cf. Approach-P group). As many approach responses were made to the discriminative stimuli for approach and the test stimuli two units removed as were avoidance responses to the discriminative stimuli for avoidance and the test stimuli two units removed. The major differences in proportion of approach and avoidance responses occurred to the range of test stimuli three to five units removed from both the discriminative stimuli for approach and avoidance. The differences are not statistically significant (see Table 31).

Figure 19 contains the three choice approach and avoidance generalization responses of the Equivalent group. There are no consistent differences between the gradients (see Table 32).

Figure 18 **Avoidance-P group: approach and avoidance
gradients — three choice data.**

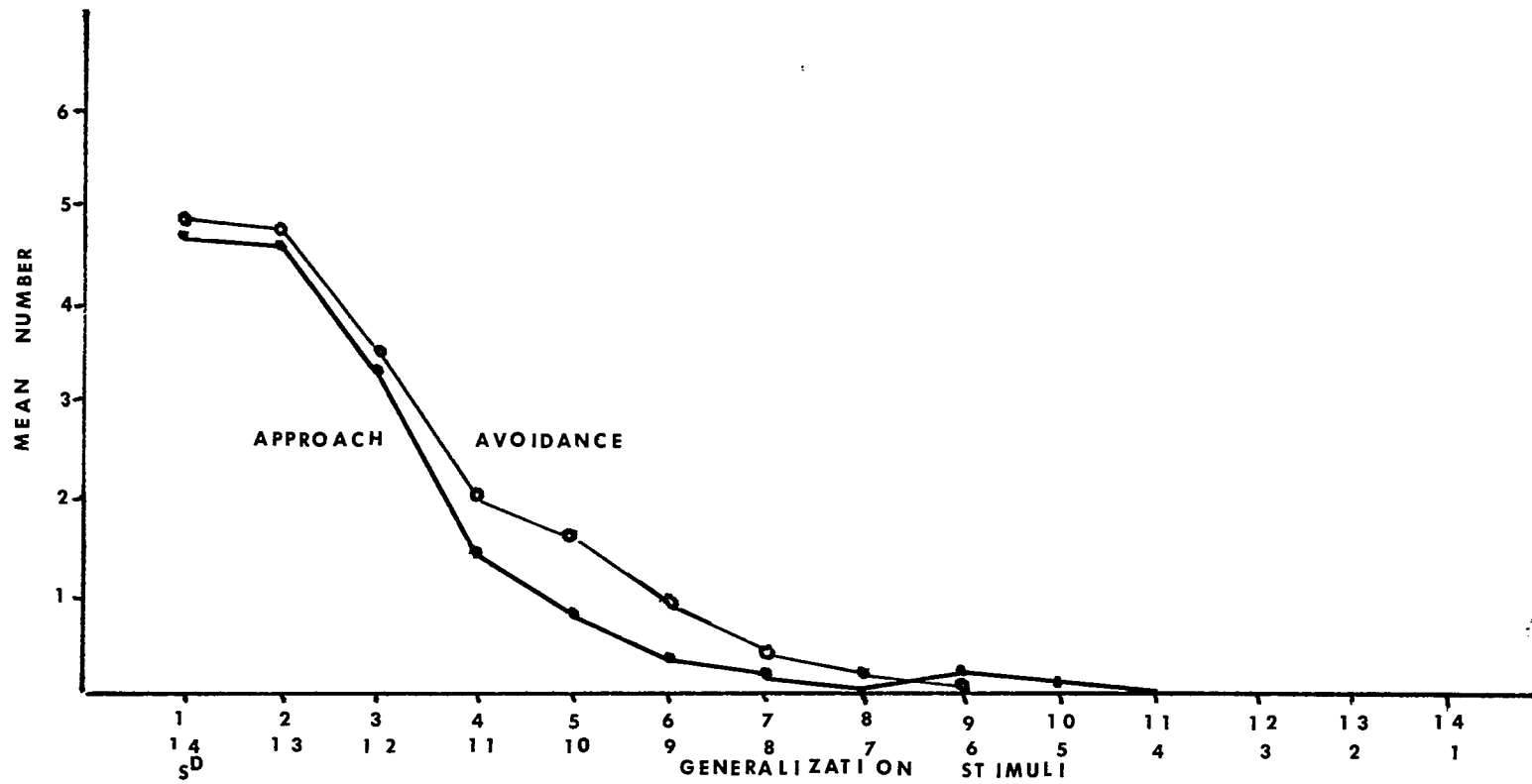


TABLE 31

Avoidance-P Group: Within Group Analysis of Variance of
the Three Choice Approach and Avoidance Generalization
Gradients

Source	df	MS	F
Response Type (A) ^a	1	4.00	2.23
Error (a)	38	1.79	
Test Stimuli (B)	13	122.00	150.62**
Response Type x Stimuli	13	.86	1.06
Error (b)	494	.81	
Total	559		

^aApproach or avoidance responses.

**p<.01

Figure 19 Equivalent group: approach and avoidance
gradients — three choice data.

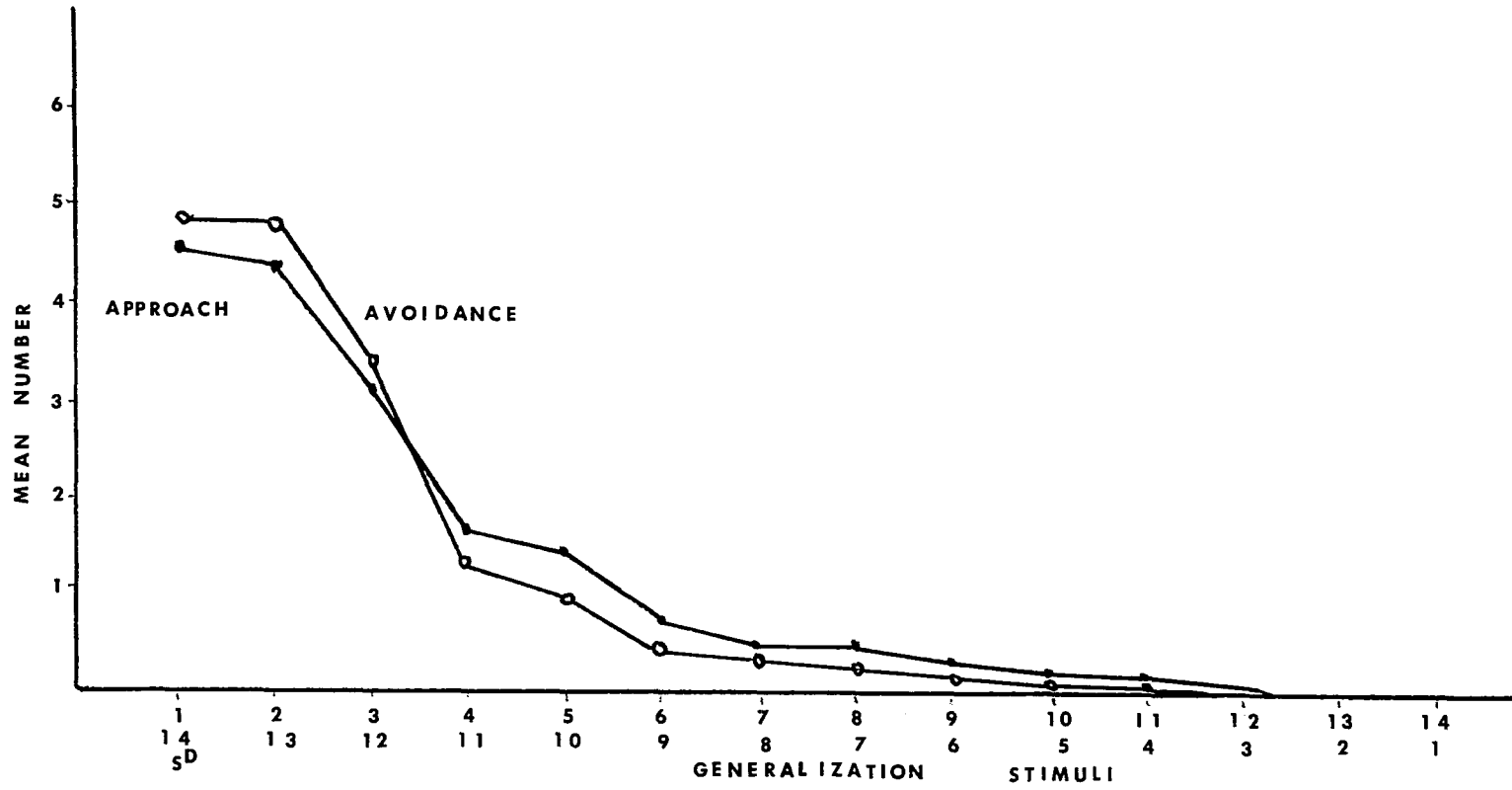


TABLE 32

Equivalent Group: Within Group Analysis of Variance of
the Three Choice Approach and Avoidance Generalization
Gradients

Source	df	MS	F
Response Type (A) ^a	1	1.00	.31
Error (a)	38	3.18	
Test Stimuli (B)	13	114.46	127.18**
Response Type x Stimuli	13	.46	.51
Error (b)	494	.90	
Total	559		

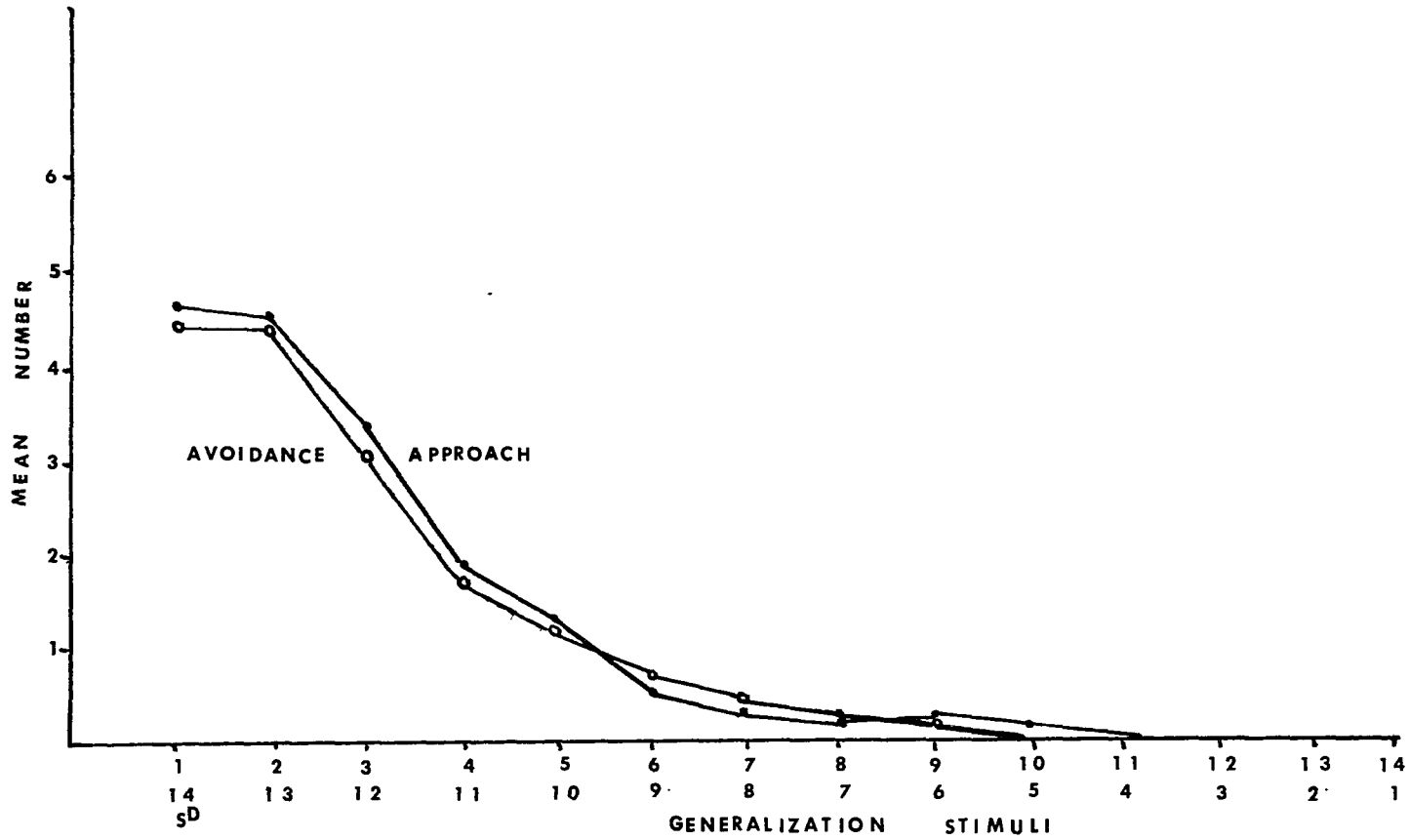
^aApproach or avoidance responses.

**p<.01

Figure 20 contains the generalization gradients that were formed by collapsing the Approach-P, Avoidance-P, and Equivalent groups. Overall, there is a slight tendency to make more approach than avoidance responses (similar to the two choice Combined group); this finding is not statistically significant ($t < 1, 13df$).

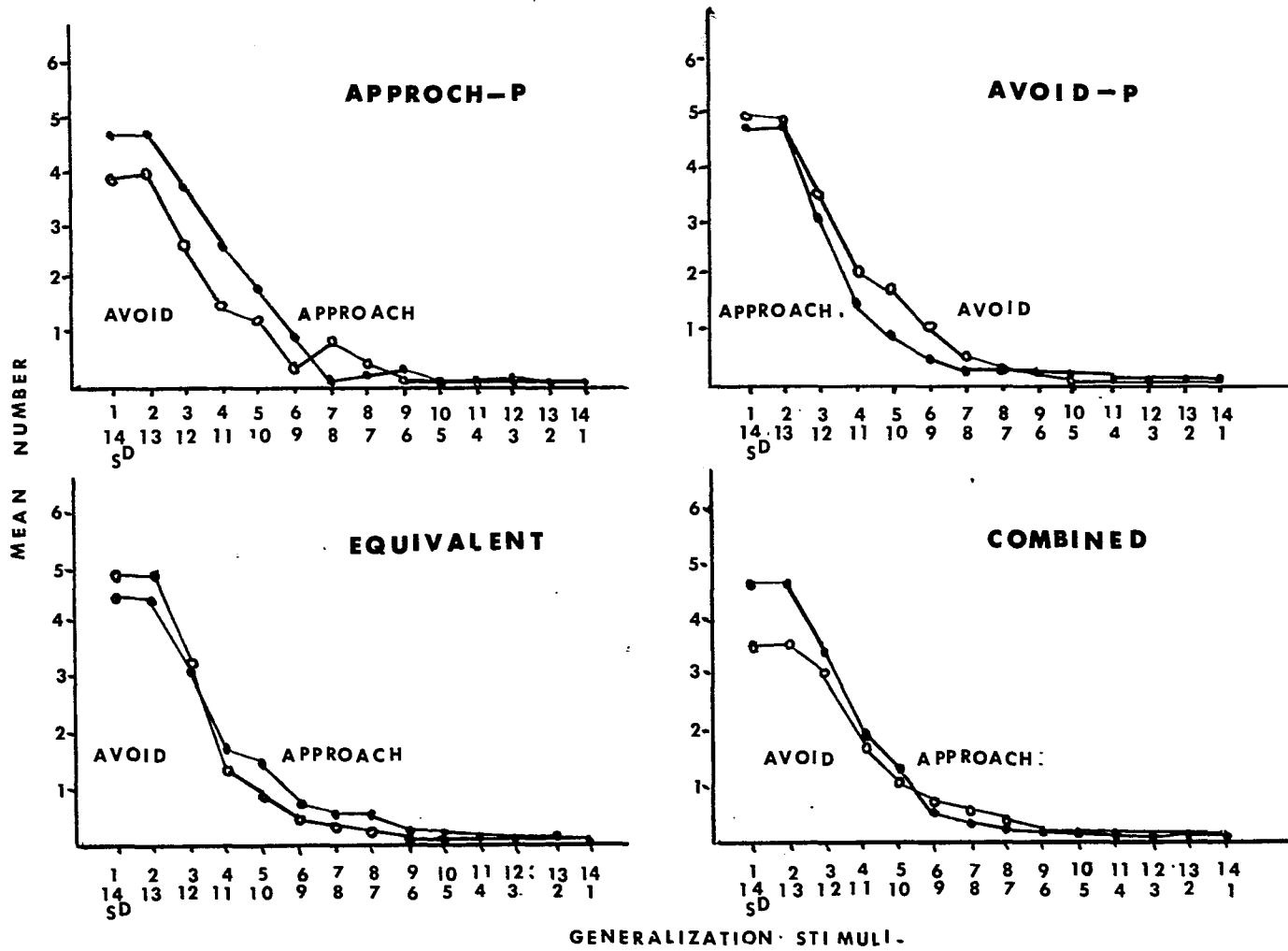
For ease of presentation, a summary of the comparisons of the approach and avoidance gradients within the Approach-P, Avoidance-P, Equivalent, and Combined groups appears in Figure 21. As can be observed, although the differences are not statistically significant, the form of the gradients is relatively consistent with the subject's pregeneralization response tendencies (group allocation).

Figure 20 **Combined Approach-P, Avoidance-P and**
Equivalent groups: three choice data.



SD

Figure 21 Summary Figure. Approach-P, Avoidance-P,
Equivalent and Combined groups: approach
and avoidance gradients — three choice
data.



GENERALIZATION STIMULI

Discussion

The results of this study demonstrate that for human subjects, approach and avoidance generalization gradients are significantly affected by subject's pregeneralization response strengths to the original discriminative stimuli for approach and avoidance. Three ways of comparing generalization gradients were utilized: comparisons of the number of responses to each of the stimuli made by subjects, the slopes of these response frequencies, and the criterion used by subjects to make judgments. These analyses were applied to the two and three choice aspects of the test situation. For these strategies, it has been shown that the generalization response tendencies of subjects, designated as predominantly approach or avoidance, are directly related to the relative trends of approach and avoidance generalization gradients, and in most instances the analyses reach statistical significance.

It appears from these data, that two separate conclusions can be drawn relevant to the issue of approach-avoidance gradients. To begin with, pregeneralization response strengths of approach and avoidance cannot be ignored in generalization testing; they are significant contributing variables that may reflect prior specific training, or inherent individual differences. To ignore this aspect of the organism's functioning would be a serious breach of research vigor. To simply assume "all other things equal" in this research area because of the experimental naivete of the subjects is too short sighted, and may account for many of the apparent discrepancies reported in the literature.

The second conclusion regarding this study relates to a much broader research question -- the generality of research findings. All too often specific research findings are "over sold;" a replication of the original test is not carried out, nor are the situational or test organism's limitations studied. Our results can be

brought to bear on these issues. The real implications of research findings are significantly increased when their theoretical limits are explicitly dealt with.

How general are concepts such as approach and avoidance? Can one equate approach for money reward with approach for food reward; or are there qualitative differences such as differences in stimulus control, or the role of internal versus external cues, that make comparisons impossible. Can an experimental study where approach and avoidance are defined in terms of "earning or avoiding a loss of money," be employed to explore experimental situations where approach and avoidance have been concerned with "acquiring food and avoiding shock?" In general, experimental data are evaluated in terms of (1) the reliability of findings and (2) the generality of findings and conclusions. A basic research axiom is that experimentation that is done in order to test the reliability of established findings should be performed in experimental environments as close to the original as

possible in order to replicate the original study. With this in mind, a true test of Miller's findings with respect to generalization gradients of approach and avoidance should be done with harnessed rats in an approach (food-reward) - avoidance (shock-punishment) runway situation. Research, however, that is carried out in order to test the generality of findings and conclusions, or to investigate new variables within past observations, by definition, allows us to explore novel test situations. Only in this manner can the limits of generality be tested. Some alternative reasons for not replicating original designs are economy, practicality and personal interests, but these are not relevant. This study in no way tests the specific findings of Miller, Hoffman and Fleshler, Wipf, or Hearst, but does offer new alternative interpretations and explanations for some of the apparent inconsistencies in their findings. The differences in approach and avoidance generalization gradients they found may reflect the pregeneralization response strength biases of their subjects toward the original approach and avoidance stimuli.

A methodological issue was exemplified in the statistical analysis of this study which was done in two parts; Part I was concerned with the generalization gradients generated by taking into account a combination of spontaneous and forced generalization responses — two choice situation, while Part II, dealt with the gradients that were produced by considering only the spontaneous generalization responses — three choice situation. This separation was prompted in part by the theoretical issues that revolve about a "two versus three choice" response category situation; and in part, by the theoretical issues that revolve about the definition of stimulus generalization. In the field of psychophysics, the problem of two category instructions such as "greater" or "less" versus three category instructions which include a "doubtful" category has long been recognized as an issue that has attracted much controversy. The middle category in the three category instructions is directly related to the response biases

of the subject; the size of the interval of uncertainty "is very dependent upon O's willingness or unwillingness to give 'doubtful judgments'" (Guilford, 1954, p.138). In our three choice situation, the factor that affects the subject's use of the middle category, and consequently his spontaneous approach and avoidance responses, is the subject's pregeneralization response tendency, or more specifically, his motivation which is a function of stimulus consequences.

With regard to the two choice situation, Warner Brown has demonstrated that when subjects are forced to guess, by eliminating the doubtful category, more right than wrong judgments are given (Guilford, 1954). Although there are no right or wrong responses in a generalization test, one can hypothesize that given two discriminative stimuli and a generalization continuum of 12 equally spaced stimuli between them; by chance, subjects should distribute their responses symmetrically, with stimuli 2-7 responded to as being more like

discriminative stimulus 1, and stimuli 8-13, as discriminative stimulus 14. This, however, is not what we found. The two choice generalization gradients were more asymmetrical and reflected response biases of the subjects more than the three choice generalization gradients. By using both two and three choice response situations, the problems that are centered about these are explicitly examined and our findings can be applied to other studies where either of these methods was used. Also, had just the three choice response methodology been utilized in this study, the magnitude of the effect of pregeneralization response strength on generalization gradients would have been greatly reduced.

In addition, the two types of test demands enable us to explore some of the issues that abound in defining and interpreting stimulus generalization. Interpretations have been postulated which consider generalization only as

an empirical phenomenon: "a subject exhibits generalization if, after he has learned to respond to a conditioned stimulus (CS), he reacts in an identical or similar way to a non-conditioned (generalized) stimulus (GS), even in the absence of specific training to the GS" (Brown, 1965). Another position, supported by Lashley and Wade, is that of a failure of discrimination hypothesis: "'Stimulus generalization' is generalization only in the sense of failure to note distinguishing characteristics of the stimulus or to associate them with the conditioned reaction. A definite attribute of the stimulus is 'abstracted' and forms the basis of reaction; other attributes are either not sensed at all or are disregarded" (1946, p. 81). Razran (1949) postulates a two factor theory of generalization: (1) pseudo-generalization and (2) true generalization. Pseudo-generalization refers to the organism's failure to discriminate among the test stimuli that are presented during generalization testing. True generalization

consists of an ability of the organism to generalize absolute characteristics of the stimuli. Although Guttman and Kalish are interested in trying to combine the "empirical phenomena of generalization" and the "hypotheses about generalization," currently the dichotomies between empirical and theoretical considerations of generalization are still predominant (Mostofsky, 1965).

Had we used only a three choice response situation, the interpretation of differences between gradients would have to reflect both "errors in discrimination" models (Subjects were instructed to respond only to the two original discriminative stimuli for approach and avoidance) as well as "response emphasis" models. The probability of a "stimulus emphasis" model contributing to the interpretation of gradient differences is slight since the generalization stimuli were discriminable, psychologically equally spaced, and counterbalanced for

all groups. By invoking a two choice response situation, we lessen the probability of "errors in discrimination" being a significant factor since subjects are forced to respond even though they have discriminated basic differences among the stimuli. If the response situation reflects only the qualities of the conditioned response which is greatly influenced by response consequences, and not errors in discrimination, then we would expect the influence of pregeneralization response tendencies to be most prevalent in the two choice gradients. This hypothesis was supported since statistically the two choice generalization gradients were more affected by pregeneralization response tendencies than the three choice gradients.

In the two choice situation, response strength differences were statistically significant factors related to the forms of the approach and avoidance generalization gradients. In this situation, every stimulus has to be judged by the subject as either the same as, or as more similar to the original approach or avoidance stimulus.

Subjects in the Approach-P group identified more test stimuli as either being, or being more like the original approach stimulus, than either the Avoidance-P or Equivalent groups. Subjects in the Avoidance-P group identified more test stimuli as being, or being more like the original avoidance stimulus. These findings reflect the basic logic of subject selection. Subjects in the Approach-P group demonstrated prior to generalization testing, a relative partiality for approach responding as measured in response latency differences. Among groups, the two choice approach gradients differed in both the number and distribution of responses with the Approach-P group making more approach responses than either the Avoidance-P or Equivalent groups; and the Avoidance-P group making the fewest. Also, for the Approach-P group, the criterion for making approach or avoidance responses was located at a point in the stimulus continuum closer to the discriminative stimuli for avoidance than the criteria of either the Avoidance-P or Equivalent groups.

In our study, it may be assumed — though no direct evidence is available — that subjects in the Approach-P group have a higher motivational level (as measured in terms of response speed) towards approach responses, and avoidance responses. Bersh, Notterman and Schoenfeld (Kimble, 1961) demonstrated that for human subjects, when various intensities of shock were used, increased shock broadened generalization gradients (see also Rosenbaum, 1953). Jenkins, Pascal, and Walker (1958) demonstrated the same phenomenon for pigeons by varying food deprivation.

Applying the Hoffman and Fleshler (1963) method of gradient analysis to our data, it appears that within the Approach-P group, for the two choice data, the avoidance gradient is steeper than the approach gradient . This finding is in agreement with the findings of Miller (1959), Hoffman and Fleshler (1963), and Wipf (1964). However, our multi-faceted analysis of the distribution of responses (using a slope and criterion analysis) makes direct comparisons

difficult. Our detailed approach to the analysis of gradients revealed that the real differences between gradients are criterion, not slope, differences. According to Miller (1959), the differences between gradients are basically due to qualitatively different factors underlying approach and avoidance behavior; external cues are involved in the learning of avoidance responses and internal cues are responsible for approach responses. However, the same explanations that he advanced for his findings are not relevant here. In our experimental situation, both approach and avoidance behaviors are dependent upon situational cues; no internal drives or cues are hypothesized for the approach responses, —and if they were to be postulated, they could just as easily be asserted for either or both the approach and avoidance responses. Our findings do not seem to reflect inherent differences between these two phenomena, but rather quantitative differences. More specifically, the major factor is the difference in the initial response tendency to the original stimuli that produce approach and avoidance.

Our findings of a "steeper" avoidance gradient are contradictory to the findings of Hearst (1960, 1962, 1965). The differences Hearst found may reflect differences in resistance to extinction between non-discriminated avoidance and discriminated approach. Our study controls for this variable by using both discriminated avoidance and approach situations which should have comparatively the same extinction rates. Had Hearst used a concurrent mixed schedule with response strength controlled, the differences between gradients that he reported might not have occurred. However, within the Avoidance-P group, the two choice approach gradient appeared to be "steeper" than the avoidance gradient. For this group, the findings are contradictory to Miller's predictions. Miller (1959) however, did foresee a situation where the approach gradient would be steeper than the avoidance gradient. His reasoning was based on differences in the type of cues involved in each of the training situations, internal versus external cues. Our findings are independent of cue differences, and can be explained most parsimoniously in terms of pregeneralization response

tendencies. The Equivalent group serves as an additional control. If differences in approach and avoidance generalization gradients are functions of inherent differences between these two processes (other than response strength differences), it would be expected that the differences would appear in the generalization gradients of the Equivalent group. So, the observation that within this group in the two choice situation, there are no significant differences either between number or distribution of responses, lends support to the basic premise that the form of the gradients is a function of the pregeneralization response tendencies of approach and avoidance.

The application of risk taking theory to the findings of differences in generalization gradients of approach and avoidance provides a new perspective. It seems to be a very fruitful way in which to describe some of the findings in this area. Risk taking generally is applied to situations in which there is a desirable goal and a lack

of certainty that it can be attained. In our experimental situation, the goal is to earn money. The fact that there are ways to lose as well as earn money makes the subject uncertain as to whether his goal will be attained. According to risk taking theory, a person formulates a subjective value, or expected utility about reinforcements, and these, in turn, account for subjective distortions of objective probability. According to Kogan and Wallach, "the SEU (subjective expected utility) position essentially states that an individual in a decision situation evaluates probabilities and payoffs, and then rationally selects the alternatives that maximizes something of value to him" (1967, p. 119). In our study, our subjects may be demonstrating individual differences in expected utility when they display relative differences in response latency to the approach and avoidance stimuli. For example, some when faced with a decision between an "approach +5¢" and an "avoidance -5¢" response demonstrate greater response tendencies toward the former, and some toward the latter alternative. According to decision making processes, a

rational decision maker chooses an act whose expected utility is the greatest (Edwards, Lindman, and Phillips, 1965). The Approach-P group maximizes approach generalization responses; the Avoidance-P group maximizes avoidance generalization responses. When response strength categories are combined, we found a greater number of approach than avoidance responses (though this difference is not statistically significant). This is in agreement with the observation that when a chance situation exists, such that actual probabilities of occurrence are the same for both outcomes of negative and positive value, outcomes of positive value are judged to be more probable than outcomes of negative value (Crandall, Solomon, and Kellaway, 1955; Irwin, 1953; and Marks, 1951).

Kogan and Wallach (1964) have demonstrated that prior gains and losses (either real or imaginary) affect subsequent decisions. This is supported by our study,

specifically the finding that some subjects modified their style of responding to the approach and avoidance stimuli from Part II to Part III of the study. These changes reflected the subject's perception of whether he was "ahead, behind, or even," financially.

The results of our investigation strongly suggest that further research in the area of approach and avoidance generalization gradients should take into account the initial response biases the subjects bring to, or learn, in the experimental situation, the nature of the response tasks, and the measurements used to analyze generalization gradients. Any one of these three variables might have significant effects on the form of generalization gradients, and these factors could account for many of the apparent discrepancies found in the literature.

Summary

This investigation was concerned with generalization gradients of approach and avoidance in human subjects, and dealt with one factor that may have accounted for discrepancies reported in the human and infrahuman literature: the relative strengths of the pregeneralization response tendencies of approach and avoidance. This study examined whether differences in value of reinforcements affected the height and slope of approach and avoidance gradients.

College students were exposed to a complex four part disjunctive reaction time situation. The dependent variable used to measure response strength was latency; responding which was followed by monetary gain constituted our approach situation, responding which could avert or cancel a monetary loss constituted our avoidance situation. The discriminative stimuli for approach and avoidance were lines of different lengths.

Sixty subjects were assigned to one of three major groups, a posteriori, based on relative differences in response latencies to approach and avoidance stimuli before

generalization testing. The three groups were named Approach-Predominant, Avoidance-Predominant, and Equivalent. For subjects in the Approach-P group, approach pregeneralization response strength was relatively greater than avoidance pregeneralization response strength (latencies to the approach stimulus were relatively shorter); the reverse was true for the Avoidance-P group. In the Equivalent group neither the approach nor avoidance response strength was predominant.

During generalization testing, two types of responding were available to subjects: (1) spontaneous generalization responses — on presentation of a test stimulus (generalization stimuli were lines of different lengths, intermediate to the approach and avoidance lines), subjects could make an approach or avoidance response, or neither and (2) forced generalization responses — if a subject did not make a response when a stimulus was presented, he was instructed by the experimenter to make a choice between the two alternatives: approach or avoidance responses. Stimulus generalization gradients were analyzed with respect to the

number of responses made by subjects to each of the stimuli, the slopes of the gradients, and the criterion used by subjects in making their judgments.

The results of our study strongly suggest that further research in the area of approach and avoidance generalization gradients should take into account the initial response biases the subject brings to, or learns, in the experimental situation, the nature of the response tasks, and the measurements used to analyze generalization gradients. Any one of these three variables might have significant effects on the form of generalization gradients, and these factors could account for many of the apparent discrepancies found in the literature.

Appendix

PhD Program in Psychology
Hunter College, C.U.N.Y.

I have accepted from N. Bruckner the sum of _____
for participating in a study at Hunter College on
_____ at _____.
date time

Signed,

TABLE 6

Between Groups Analysis of Variance of the Slope of the
Two Choice Avoidance Generalization Responses (Line 1
is S^D for Avoidance)

Source	df	MS	F
Groups (A) ^a	2	70.4	.07
Response Side (B)	1	987.1	.96
Groups x Side (A X B)	2	1080.0	1.05
Within Treatments	24	1031.2	
Total	29		

^aApproach-P, Avoidance-P, or Equivalent Groups.

^bLeft or right side for avoidance responses.

TABLE 9

Between Groups Analysis of Variance of the Slope of the
Two Choice Avoidance Generalization Responses (Line 14
is S^D for Avoidance)

Source	df	MS	F
Groups (A) ^a	2	63.8	0.11
Response Side (B) ^b	1	99.7	0.17
Groups x Side (A X B)	2	1680.8	2.92
Within Treatments	24	575.5	
Total	29		

^aApproach-P, Avoidance-P, or Equivalent Groups.

^bRight or left side for avoidance responses.

TABLE 10

Between Groups Analysis of Variance of the Criterion of
the Two Choice Avoidance Generalization Responses (Line 1
is S^D for Avoidance)

Source	df	MS	F
Groups (A) ^a	2	.0052	2.36
Response Side (B) ^b	1	.0016	.73
Groups x Side (A X B)	2	.0012	.55
Within Treatments	24	.0022	
Total	29		

^aApproach-P, Avoidance-P, or Equivalent Groups.

^bRight or left side for avoidance responses.

TABLE 14

Between Groups Analysis of Variance of Three Choice
Approach Generalization Responses

Source	df	MS	F
Groups ^a	2	42.50	1.10
Response Side ^b	1	38.00	.99
Discriminative Stimuli ^c	1	6.00	.16
Groups x Side	2	49.00	1.27
Groups x S ^D	2	90.50	2.35
Side x S ^D	1	2.00	.05
Groups x Side x S ^D	2	15.50	.40
Within Treatments	48	38.52	
Total	59		

^aApproach-P, Avoidance-P, or Equivalent groups.

^bLeft or right side for avoidance responses.

^cDiscriminative stimulus 1 or 14 for avoidance.

TABLE 16
 Between Groups Analysis of Variance of Three Choice
 Avoidance Generalization Responses

Source	df	MS	F
Groups ^a	2	71.50	2.57
Response Side ^b	1	96.00	3.45
Discriminative Stimuli ^c	1	17.00	.61
Groups x Side	2	50.00	1.80
Groups x S ^D	2	33.50	1.20
Side x S ^D	1	25.00	.90
Groups x Side x S ^D	2	29.50	1.06
Within Treatments	48	27.81	
Total	59		

^aApproach-P, Avoidance-P, or Equivalent groups.

^bLeft or right side for avoidance responses.

^cDiscriminative Stimulus 1 or 14 for avoidance response.

TABLE 19

Between Groups Analysis of Variance of the Slope of the
 Three Choice Approach Generalization Responses (Line 1
 is S^D for Avoidance)

Source	df	MS	F
Groups (A) ^a	2	252.6	.75
Response Side (B) ^b	1	2.2	.01
Groups x Side (A X B)	2	625.8	1.87
Within Treatments	24	334.9	
Total	29		

^aApproach-P, Avoidance-P, or Equivalent groups.

^bRight or left side for avoidance responses.

TABLE 20

Between Groups Analysis of Variance of the Criterion of
the Three Choice Approach Generalization Responses
(Line 1 is S^D for Avoidance)

Source	df	MS	F
Groups (A) ^a	2	.0406	2.92
Response Side (B) ^b	1	.0223	1.60
Groups x Side (A X B)	2	.0076	.55
Within Treatments	24	.0139	
Total	29		

^aApproach-P, Avoidance-P, or Equivalent groups.

^bLeft or right side for avoidance responses.

TABLE 22

Between Groups Analysis of the Slope of the Three
Choice Approach Generalization Responses (line 14
is S^D for Avoidance)

Source	df	MS	F
Groups (A) ^a	2	47.4	.25
Response Side (B) ^b	1	20.8	.11
Groups x Side (A X B)	2	376.0	1.96
Within Treatments	24	192.1	
Total	29		

^aApproach-P, Avoidance-P, or Equivalent groups.

^bRight or left side for avoidance responses.

TABLE 23

Between Groups Analysis of Variance of the Criterion of
 the Three Choice Approach Generalization Responses
 (Line 14 is s^D for Avoidance)

Source	df	MS	F
Groups (A) ^a	2	.055	.647
Response Side (B) ^b	1	.064	.752
Groups x Side (A X B)	2	.051	.600
Within Treatments	24	.085	
Total	29		

^aApproach-P, Avoidance-P, or Equivalent groups.

^bRight or left side for avoidance responses.

TABLE 25

Between Groups Analysis of Variance of the Slope of the
 Three Choice Avoidance Generalization Responses (line 1
 is S^D for Avoidance)

Source	df	MS	F
Groups (A) ^a	2	184.6	.62
Response Side (B) ^b	1	883.2	2.98
Groups x Side (A X B)	2	71.6	.24
Within Treatments	24	296.3	
Total	29		

^aApproach-P, Avoidance-P, or Equivalent groups.

^bRight or left side for avoidance responses.

TABLE 26

Between Groups Analysis of Variance of the Criterion of
the Three Choice Avoidance Generalization Responses
(Line 1 is S^D for Avoidance)

Source	df	MS	F
Groups (A) ^a	2	.0765	2.38
Response Side (B) ^b	1	.0746	2.32
Groups x Side (A X B)	2	.0848	2.64
Within Treatments	24	.0321	
Total	29		

^aApproach-P, Avoidance-P, or Equivalent groups.

^bRight or left side for avoidance responses.

TABLE 28

Between Groups Analysis of Variance of the Slope of the
 Three Choice Avoidance Generalization Responses (Line 14
 is S^D for Avoidance)

Source	df	MS	F
Groups (A) ^a	2	173.5	.94
Response Side (B) ^b	1	479.4	2.61
Groups x Side (A X B)	2	123.4	.67
Within Treatments	24	183.7	
Total	29		

^aApproach-P, Avoidance-P, or Equivalent groups.

^bRight or left side for avoidance responses.

TABLE 29

Between Groups Analysis of Variance of the Criterion of
the Three Choice Avoidance Generalization Responses
(Line 14 is S^D for Avoidance)

Source	df	MS	F
Groups (A) ^a	2	1.39	.96
Response Side (B) ^b	1	1.36	.93
Groups x Side (A X B)	2	1.47	1.01
Within Treatments	24	1.45	
Total	29		

^aApproach-P, Avoidance-P, or Equivalent groups.

^bRight or left side for avoidance responses.

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Autobiographical Statement

The author received a Bachelor of Arts degree from Hunter College in 1963. She entered the doctoral program in psychology at The City University of New York in the same year. There, she was awarded a National Defense Education Act Fellowship for 1963, 1964, and 1965. In February of 1965, she received a Master of Arts degree from Hunter College and was appointed Lecturer in the Department of Psychology there. In 1967, she was appointed Instructor at Lehman College.

In 1968, the author accepted a part time position as Research Associate at the Shield Institute for Retarded Children where she is presently directing "An examination and evaluation of services for the retarded in New York" with a grant sponsored by the New York State Department of Mental Hygiene. In addition, in the Fall of 1969, she was appointed Instructor in the Department of Psychology at Adelphi University where she is currently teaching.

