ANXIETY RELIEF CONDITIONING:
A CRITICAL REVIEW AND SUPPORTIVE EXPERIMENT

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An experiment was conducted to separate the effects of anxiety relief conditioning from other variables which may be operative within that paradigm. A review of the literature revealed that no definitive investigations had been conducted, and critiques of these investigations were offered. Also, the distinction between aversion relief and anxiety relief conditioning procedures was detailed.

In an attempt to offer evidence supportive of the efficacy of anxiety relief conditioning as a therapeutic technique per se, an experiment was conducted which attempted to control those variables which presumably may have confounded the findings of previous research. Two groups of snake phobic Ss were matched on the basis of an objective snake approach task. These Ss were subjected to three 15-min. sessions of either anxiety relief conditioning or pseudoconditioning. It was hypothesized that the anxiety relief conditioning group would demonstrate therapeutic efficacy while the pseudoconditioning group would show no appreciable change. Analysis of the results revealed a statistically significant difference in the predicted direction. Experimental support for the effectiveness of anxiety relief conditioning as a separate and distinct therapeutic technique was thereby obtained.

ANXIETY RELIEF CONDITIONING: A CRITICAL REVIEW AND SUPPORTIVE EXPERIMENT

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The behavior therapy technique of systematic desensitization, based on the principle of reciprocal inhibition, has received considerable clinical attention and the support of numerous controlled investigations (Lang and Lazovik, 1963; Lang, Lazovik, and Reynolds, 1965; Moore, 1965; Cooke, 1966; Paul, 1966; Paul, 1967; Davison, 1968). One of the primary reasons for these investigations was to assess the effective components of the technique, and the effects of other variables, including placebo, which may have been operative within the technique. The possibility of placebo is ubiquitous, especially in procedures designed for use with anxious clients. (Shapiro, 1971). It was suggested that the therapeutic results of systematic desensitization could possibly be attributed to extinction of conditioned responses due to repetition or implosion, habituation, the interpersonal relationship of client-therapist, expectations of success, placebo effects, or to some other non-specified variable or set of variables. Although the results of studies which controlled these variables supported the efficacy of systematic desensitization and the principle of reciprocal inhibition, they did not support every technique presumably based on this principle. For instance, the clinical "success" of anxiety relief conditioning, an alternate procedure based on the principle of reciprocal inhibition, has received little or no convincing, or unequivocal empirical support. Further, the possibility of other unspecified variables operating within the anxiety relief conditioning paradigm is probably greater than was their likelihood within the systematic desensitization paradigm. In addition to the variables noted earlier (implosion, habituation, placebo, etc.), the anxiety relief conditioning

technique also contains another potentially important confounding variable in the form of faradic aversive stimulation.

Anxiety relief conditioning was first described by Wolpe (1958) as a means of countering anxiety. The original procedure arranged for the client to receive an uncomfortable faradic shock, which was terminated immediately after he emitted the word "calm." The termination of shock was followed by a period of relief, and the concomitants of this relief phase were hypothesized to be incompatible with anxiety and similar emotional discomforts. It was believed that after several repetitions of this procedure, the relief responses would become conditioned to the word "calm," and the client could then subvocally utter the word when he found himself in anxiety-provoking situations, and, thereby, inhibit anxiety.

Several years after Wolpe introduced anxiety relief conditioning, Wolpe and Lazarus (1966) described several variations within the basic paradigm. These variations concerned the manner in which faradic aversive stimulation was applied, and included: (a) steady-shock escape; (b) increasing-shock escape; and (c) shock avoidance. In the steady-shock escape condition, the client receives a steady, uncomfortable, but not unbearable shock. After enduring this shock for a period sufficient to make shock-cessation definitely desirable, the client utters the word "calm" and the shock ceases.

In the increasing-shock escape condition, the only variation is the manner in which a strong desire for shock cessation is approached. Instead of beginning with a high intensity shock, the level is initially low, and is steadily increased to the point where the client feels the "desire" to say "calm." The shock is then terminated.

Because some clients experienced mere sensory discomfort as opposed to emotional discomfort when subjected to the steady, or increasing-shock escape conditions, the shock cessation produced only sensory relief, not the emotional relief considered necessary for the development of a relief phase and effective anxiety relief conditioning. Therefore, a third condition was established in which the client received a powerful current until he uttered the word "calm," at which time the shock ceased. Shortly thereafter, a second, more powerful current was delivered until the word "calm" was uttered. The client was then informed that the therapist would say "shock," and that ten seconds later an even more powerful current would be delivered. The client was told to anticipate the shock for at least five seconds, and if he then uttered the word "calm," the shock would be avoided.

The anxiety relief conditioning technique was employed by Wolpe (1958) and by Wolpe and Lazarus (1966) to equip their clients with an anxiety-inhibitor for general use. Solyom and Miller (1967) used anxiety relief conditioning in a much more specific manner with phobic clients, although under the rubric, "aversion relief," instead of anxiety relief. Their procedure required each client to prepare several written accounts of past and future (anticipated) anxiety-provoking episodes and to record these episodes on tape in narrative form. Clients were also required to obtain anxiety-provoking pictures relevant to their particular phobia. In the treatment situation, the client heard the tape-recorded phobic narrations played through earphones. Within each tape, lapses of silence were strategically placed so that a silence of about thirty seconds duration was

terminated immediately prior to the description of an especially anxiety-provoking scene. Just prior to hearing the anxiety-provoking scene, the client received a faradic shock to his finger which he could terminate by pressing an escape button. Immediately following the shock termination, the client heard the phobic narration through the earphones. The phobic stimuli were contiguous with the relief phase which succeeded faradic shock termination, and the phobic stimuli were consequently paired with the relief responses. Similarly, anxiety-provoking pictures were presented to the client during the relief phase, which also provided for counterconditioning to be effected. In this manner, the anxiety responses typically associated with the anxiety stimuli were presumably inhibited by the incompatible feelings of relief and comfort generated by faradic shock termination.

Solyom and Miller (1967) reported very favorable clinical results of this technique, with six of seven clients being free of their phobias at the time of follow-up, about twenty months later. However, the analysis of the results did not allow for assessment of the efficacy of the procedure, and the lack of adequate controls precluded the assignment of the results to the operation of reciprocal inhibition through anxiety relief conditioning. As the authors concluded, more uneqivocal empirical evidence is required to determine if anxiety relief conditioning was the crucial operation, or "whether clinical improvement is due to repeated 'safe' rehearsal of the phobic situation or is just a function of the aversive properties of the therapeutic procedures" (p. 324).

At a later date, Solyom, McClure, Heseltine, Ledwidge, and Solyom (1972) conducted an experiment to test the propositions noted above, namely, whether client improvement was due to aversive stimulation, habituation, or anxiety relief conditioning. The experimental paradigm was essentially the one described by Solyom and Miller (1967) earlier. In the test conditions, "Lapses of silence averaging 15 sec. in duration interrupted the narrative at appropriate points — prior to anxiety stimuli and anxiety responses for the aversion relief and habituation groups, randomly for the pseudoconditioning group. In the aversion relief and pseudoconditioning procedures, the silence was followed by a finger electric shock . . ." (p. 23). The habituation group received no shock at all.

Analysis of the results revealed that there were no statistically significant between-group differences, although more subjects in the aversion relief group improved to a greater degree on more criteria variables than did subjects in either of the two other groups. As a result, the authors pointed out that "the assumption that it is not aversion relief but aversive stimulation which is responsible for improvements can be neither accepted nor rejected" (p. 27).

In the Solyom et al. (1972) study, there was one important methodological flaw in the pseudoconditioning procedure which would reduce the possibility of assigning results to aversion relief or pseudoconditioning. The authors noted that in the pseudoconditioning group, "A post hoc analysis . . . revealed that 19.9% (range 7-38%) of all aversion relief was administered at points where it could have relieved anxiety" (p. 27). Aside from receiving possible

aversion relief at specific, relevant points, their procedure utilized aversion relief within the phobic narration as a whole. It could be argued that the entire narration, because of its main theme and content, was of a phobic nature, and this arrangement would contain anxiety reducing properties indistinguishable from those properties of the aversion relief group procedure. A true pseudoconditioning group would hear the narration before receiving any shock, thereby eliminating the possibility of any anxiety relief conditioning.

Gaupp, Stern, and Galbraith (1972) reported a study of aversion relief conditioning which is partially relevant to the present investigation. Their procedure was somewhat different operationally from that of Solyom and Miller (1967) in that an aversion stimulus (the word "shock") was used to signal the onset of faradic shock and a phobic stimulus (the picture of a snake) was used to signal aversion relief, or the absence of shock. This was essentially a differential conditioning paradigm, similar to that employed by Thorpe et al. (1964) and Solyom and Miller (1965) in the treatment of clients suffering from anxiety and sexual disorders. As Bandura (1969) pointed out, "This particular method is predicated on the assumption that stimuli associated with aversion relief will acquire positive properties" (p. 521).

In the interest of clarification, a distinction will be drawn at this point between the aversion relief paradigm employed by Thorpe et al. (1964), Solyom and Miller (1965) and Gaupp et al. (1972), and the anxiety relief paradigm employed by Solyom and Miller (1967). In the latter paradigm there was no aversion stimulus signalling the onset of faradic shock. That is, the Solyom and Miller (1967) paradigm was

identical to Wolpe's (1958) anxiety relief conditioning paradigm, and was predicated on the assumption that anxiety-provoking stimuli associated with aversion relief will acquire new conditioned responses due to the operation of reciprocal inhibition. In the Solyom and Miller (1967) procedure, the faradic shock was delivered during a lapse of silence, and its onset was not paired with aversion (inappropriate) stimuli. The second component of the paradigm, phobic stimuli contiguous with faradic shock termination, was identical in both procedures. These distinctions are presented diagrammatically in Figure 1.

Aversion relief:

aversion stimulus---shock/termination---relief stimulus
(e.g., nude male) (e.g., nude female)

Anxiety relief:

----------shock/termination---relief stimulus
(e.g., snake slide)

Fig. 1--A diagrammatic distinction between aversion and anxiety relief conditioning procedures.

The results of the Gaupp et al. (1972) study revealed a statistically significant difference ($p<.05$), after only one session, between a false heart-rate feedback group receiving aversion relief conditioning and a no-treatment control group. The experimental (aversion relief) group demonstrated greater gains on criteria measures than did the control group. Although these results suggested that anxiety-reducing factors were operative in the aversion relief procedure, they did not specify those components within the paradigm which were functionally related to anxiety reduction. Therefore, the same

basic questions regarding the efficacy of anxiety relief therapy remain: Is anxiety relief therapy effective because of counterconditioning which takes place during the relief phase, or are there other variables such as faradic aversive stimulation, adaptation, habituation, or placebo components which might just as readily account for the results found in the literature?

In summary, anxiety relief and aversion relief conditioning procedures have received considerable clinical and experimental attention. However, results of these investigations do not permit the delineation and specification of the functional variables involved with any degree of confidence. It is within this context that the present investigation took form. The design of this experiment was intended to obtain some supportive evidence for the efficacy of anxiety relief conditioning, *per se*, as a therapeutic technique based upon a rather parsimonious counterconditioning model. The design was also intended to exclude other explanations of the results of applied anxiety relief conditioning such as implosion, adaptation, habituation, aversivity, and placebo effects. It was hypothesized that the anxiety relief conditioning procedure would produce greater specific benefits than the pseudoconditioning procedure.

Method

Subjects. The *S*s were 20 females drawn from the Psychology Department subject pool of North Texas State University. All *S*s received academic credit for their participation. The *S*s were selected because they reported relatively intense fears of snakes, as well as the absence of any known cardiac condition preventing their receipt of faradic shock.

Procedure. The Ss who had volunteered to participate in the experiment reported individually to the experimental room of the Center for Psychological Services of North Texas State University. They were asked to attempt a 10-point Behavioral Approach Task (BAT) modeled after the Snake Intimacy Test constructed by Gaupp et al. (1972). For the BAT test, each S was asked to (1) enter the room and look at the snake; (2) walk to the table on which the snake was placed; (3) sit in a chair next to the table; (4) place the palm of one hand on the outside of the cage, next to the snake; (5) stand up, remove the top of the cage, and look down into the cage at the snake; (6) place one hand over the top of the cage, level with the top of the cage; (7) lower the hand into the cage, at least three-fourths of its depth; (8) touch the snake; (9) pick the snake up a few inches; and (10) pick the snake up and out of the cage. The object of the BAT was a non-poisonous king snake, approximately three feet long, housed in a glass cage. The Ss were instructed to move as close to the snake as possible without fear or discomfort. It was emphasized that they were to stop, and remain at the point where they stopped, if they experienced any sensations of unease or anxiety. To help assure experimental naivete, the Ss were informed that the research was an investigation into the physiology of anxiety, and "bogus" galvanometer electrodes were attached to two of their fingers during the pre- and post-treatment BATs. The point at which the S stopped on the pre-treatment approach task was recorded, and this point became the S's score on the BAT.

All Ss proceeding to point (8) on the BAT were given experimental credit and excluded from further participation

in the research. Therefore, the operational definition of "snake phobia" used in the investigation was the inability to proceed past point (7) on the BAT.

Subjects were matched as closely as possible on BAT scores and randomly assigned to either the conditioning group or pseudoconditioning group. In the one case where a perfect match was not possible, the S of the pair having the lower BAT score was assigned to the conditioning group.

On the fourth day following pre-treatment assessment, the Ss began reporting individually for the experimental sessions. The three experimental sessions were conducted on three consecutive days, one session per day.

Stimuli. In the shock condition (see Fig. 2), a faradic shock indicated the termination of the intertrial interval. The shock was delivered from a Farrall Instruments "Behavior Modifier" Mark II shock apparatus via two electrodes attached to the ventral surface of the S's non-dominant forearm, midway between the wrist and elbow. The current pulsated at the rate of 14 pulses per second. A fixed-duration shock of 1.5 sec. was used. The shock intensity level was individually established for each S as the midpoint between sensation and pain thresholds. This intensity level was re-evaluated following the second experimental session to preclude adaptation and to guard against sensitization, and adjustments were made accordingly.

In the non-shock condition (see Fig. 2), a tone indicated the termination of the intertrial interval. The tone was transmitted by a Panasonic tape recorder located near the S. The tone duration was fixed at 1.5 sec.

The phobic stimuli, 15 35mm color slides projected from a Kodak projector located behind and immediately to the left of the S, depicted various types of snakes engaged in various behaviors (e.g., poised ready to strike, crawling, eating). The snake slides had been previously graded by 42 raters in terms of the degree of fear each slide provoked. The slides were presented hierarchically, from least to most fear-provoking.

The neutral stimuli were 15 35mm color slides depicting various country-side scenes and were judged by the experimenter and several colleagues to contain no fear-provoking properties. The entire experimental procedure was automated by LeHigh Valley programming equipment. In the semi-dark experimental room, each S was seated in a wooden, hard-backed chair approximately eight feet in front of a viewing screen and exposed to one of the following conditions.

Anxiety Relief Conditioning Group (ARCG): The 10 Ss in the ARCG group were exposed to a procedure consisting of two consecutive conditions. Condition 1: After the S was ready, the projector was activated and the viewing screen was illuminated. The S saw nothing but a blank, white screen. Thirteen and one-half seconds after illumination of the screen, a 1.5-sec. tone was emitted from a nearby tape recorder. After 1.5 sec. duration, the tone was terminated, the projector advanced one step, and a neutral stimulus slide was projected onto the screen. The neutral slide was terminated after 15 sec. exposure, and the projector advanced another blank slide. After 13.5 sec. exposure of the blank slide, the tone was again heard for 1.5 sec., the termination of which advanced another neutral slide for 15 sec. This

procedure was repeated until the 15 neutral slides had been presented. Condition 1 was terminated with the presentation of the 15th neutral slide. The beginning of the 16th blank slide marked the initiation of the second condition. Condition 2: Ten seconds before receiving the first shock, each S was told that "the shock condition will now begin." Thirteen and one-half seconds after the onset of the 16th blank slide, the S received a faradic shock of 1.5 sec. duration. After 1.5 sec. duration, the faradic shock was terminated, the projector advanced one step, and a snake slide was exposed for 15 sec. The snake slide was terminated after 15 sec. exposure, and the projector advanced another blank slide. After 13.5 sec. exposure of the blank slide, the S again received a faradic shock for 1.5 sec., the termination of which again advanced another snake slide for 15 sec. exposure. This procedure was repeated until the 15 snake slides had been presented. Condition 2, as well as the session, was terminated after the presentation of the 15th snake slide. The entire Condition 1 - Condition 2 procedure was repeated at each of the three experimental sessions.

Pseudoconditioning Group (PCG): The 10 Ss in the PCG group were also exposed to a procedure consisting of two consecutive conditions. Condition 1: After the S was ready, the projector was activated and the viewing screen was illuminated by a blank slide. Thirteen and one-half seconds after the screen illumination, a 1.5-sec. tone was emitted from a nearby tape recorder. After 1.5 sec. duration, the tone was terminated, the projector advanced one step, and a snake slide was projected onto the screen. The snake slide was terminated after 15 sec. exposure and the projector

advanced another blank slide. After 13.5 sec. exposure of the blank slide, the tone was again heard for 1.5 sec., the termination of which advanced another snake slide for 15 sec. This procedure was repeated until the 15 snake slides had been presented. Condition 1 was terminated with the presentation of the 15th snake slide. The beginning of the 16th blank slide marked the initiation of the second condition. Condition 2: Ten seconds before receiving the first shock, each S was told that "the shock condition will now begin." Thirteen and one-half seconds after the onset of the 16th blank slide, the S received a faradic shock of 1.5 sec. duration. After 1.5 sec., the faradic shock was terminated, the projector advanced one step, and a neutral slide was exposed for 15 sec. The neutral slide was terminated after 15 sec. exposure, and the projector advanced another blank slide. After 13.5 sec. exposure of the blank slide, the S again received a faradic shock for 1.5 sec., the termination of which advanced another neutral slide. This procedure was repeated until the 15 neutral slides had been presented. Condition 2, as well as the session, was terminated after the presentation of the 15th neutral slide. The entire Condition 1 - Condition 2 procedure was repeated at each of the three experimental sessions. Figure 2 illustrates the difference between the ARCG and PCG procedures and paradigms.

Each experimental session lasted exactly 15 min., and each S received 15 1.5 sec. shocks and heard 15 1.5 sec. tones during each of the three sessions. Each S also saw 15 snake slides and 15 neutral slides during each of the three sessions. The three experimental sessions were conducted on three consecutive days, and the post-treatment BAT

was conducted on the day following the last experimental session. To reduce the possibility of experimenter bias, the instructions for engaging in the post-treatment BAT were presented via tape recording.

	Condition 1	Condition 2
ARCG (sec.)	Blank---Tone---Neutral (13.5) (1.5) (15)	Blank---Shock---Snake (13.5) (1.5) (15)
PCG (sec.)	Blank---Tone---Snake (13.5) (1.5) (15)	Blank---Shock---Neutral (13.5) (1.5) (15)

Fig. 2--The difference between the ARCG and PCG procedures and paradigms.

Results

The pre- and post-treatment BAT raw scores and means for each group are presented in Table 1. There was no difference between the pre-treatment BAT means, indicating that matching had been successfully accomplished. A one-tailed *t* test for matched groups provided a *t*-ratio of 2.09 and a p-value of less than .04, which indicated a significant difference between post-treatment BAT means.

Inspection of Table 1 reveals that eight of ten ARCG *S*s improved by at least one point on the BAT; the total group increase was 13 points. Only three of ten PCG *S*s improved by at least one point on the BAT, with a group increase of 5 points. Two ARCG *S*s showed no improvement on the BAT, while five PCG *S*s showed no improvement. Furthermore, while no ARCG *S*s evidenced deterioration (i.e., a decrease in score),

deteriorative effects of two PCG Ss led to a decrease in the total BAT score of 4 points, resulting in a net gain of only one point for that group.

TABLE I

PRE- AND POST-TREATMENT BAT RAW SCORES AND MEANS FOR ARCG AND PCG GROUPS

Pre-BAT		Post-BAT	
ARCG Raw Scores	PCG Raw Scores	ARCG Raw Scores	PCG Raw Scores
2	3	4	3
4	4	7	6
4	4	4	4
4	4	5	6
5	5	6	6
6	6	7	6
6	6	6	6
6	6	7	6
7	7	8	4
7	7	10	6
Mean 5.1	5.2	6.4*	5.3

*$p < .04$.

Discussion

Results of early clinical applications suggested that anxiety relief conditioning was an effective technique for reducing or eliminating anxiety responses. Equivocal results of several experimental investigations, however, also suggested that other variables, such as implosion, habituation, placebo, etc., may have been responsible for anxiety reduction. Further investigations which attempted to control for these

variables also produced equivocal results, due primarily to inadequate control procedures. The purpose of the present investigation was to control for these variables and thereby specify whether or not anxiety reduction was a function of anxiety relief conditioning or a function of other variables within that paradigm.

All Ss in both the ARCG and PCG groups were repeatedly exposed to the same phobic, neutral, and shock stimuli. The crucial difference between conditions of exposure to these stimuli was that one group was subjected to the anxiety relief conditioning paradigm and the other group was not. Since the ARCG group evidenced significantly greater gains than did the PCG group, considerable support was given to the position that the anxiety relief conditioning paradigm, based on the relatively parsimonious reciprocal inhibition or counterconditioning model, is an effective anxiety reducing technique.

In an effort to increase the effectiveness of this technique, further research should focus on additional considerations. These considerations would include (a) the length of the relief phase; (b) the point within the relief phase at which the phobic stimuli should be introduced for maximum effectiveness; (c) the optimal length of the pre-shock period; (d) the optimal number of trials per session; (e) how differing schedules of shock effect results; (f) the feasibility of replacing the shock with a conditioned stimulus; and (g) whether symbolic stimuli are as effective as actual stimuli.

Finally, while the results of the present investigation suggested that anxiety relief conditioning per se is an

effective therapeutic technique in the reduction of fear or anxiety, it would also appear reasonable to hypothesize that the therapeutic benefits of anxiety relief conditioning should hold efficacy for the amelioration of a wide variety of discomforting emotional reactions. Future investigatory programs should also be directed towards a delineation of the variety of emotional problems for which this technique may be applicable and expeditious.

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