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SHOCK INTENSITY AND FEAR OF SHOCK IN THE MODIFICATION OF HOMOSEXUAL BEHAVIOR IN MALES BY AVOIDANCE LEARNING

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Summary—Twenty-six males requesting treatment for homosexual behavior were assigned either to a group in which *S* selected his own shock intensity or a group in which *E* routinely assigned 5 mA stimulation. Following 20 sessions of avoidance training the two groups were compared for number of sessions attended and change in erectile response to nude slides. The 5-mA group changed significantly more ($p = 0.047$) and attended no fewer sessions ($p = 0.0735$) than did the self-assigned group. In addition *S*s' self-ratings of fear of shock before training correlated significantly with number of sessions attended ($p = 0.05$) and current level selected in the self assigned group ($p = 0.05$), but not with outcome ($p = 0.1230$).

RECENT investigations have documented the effectiveness of clinical aversive techniques in modifying homosexual behavior in males (Birk, Huddleston, Miller and Cohler, 1971; McConaghy, 1971; MacCulloch, Birtles and Feldman, 1971; Tanner, 1972). Two of these investigators have attempted to predict training outcome with *S* parameters. McConaghy (1971), for example, has reported that there was no significant relationship between outcome and the size of *S*'s classically conditioned erectile response during pretraining assessment. McConaghy did find, however, that changes in *S*s' reports of subjective sexual arousal correlated significantly with changes in erectile response 1 yr after termination, but did not correlate significantly 2 weeks after termination. He concluded that the subjective reports "at 1 yr were more reliable (*sic*) than those at 2 weeks; the longer time allowed the patients to assess their feelings more accurately". Assuming that McConaghy meant that the 1-yr report was more valid than the 2-week report, and since the 1-yr report correlated significantly with the erectile change while the 2-week report did not, it appears that the erectile response at termination is a better predictor of sexual status at the 1-yr follow-up than is *S*'s report of his feelings at termination.

MacCulloch *et al.* (1971) found that their training was more successful with men who reported prior pleasurable heterosexual experience than with men who reported no such experience. Training was also reported to be less effective with men described as "severe personality disorders of the attention-seeking or weak-willed types". The authors suggest that these categories may eventually be operationalized through scores on scale *C* of the 16 PF Inventory and the heterosexual score on the Sexual Orientation Method questionnaire.

The present study proposes to examine the relationship of one-*S*-parameter (fear of electric shock) and one-program parameter (shock intensity) to training outcome, to number of sessions attended, and to each other. Animal research has found that response suppression increases as shock intensity is increased with punishment (Rachlin and Herrnstein, 1969),

while escape behavior also increases as shock intensity is increased (Azrin and Holz, 1966). Miller and Weiss (1969) indicate that a review of the literature regarding escape and avoidance training in shuttle boxes suggests that avoidance decreases as shock intensity increases because of freezing. No analogue of freezing has been reported for clinical avoidance learning so one would not expect this to be a problem in the clinic. However, MacCulloch *et al.* (1971) speculate that high shock intensity may account for the high dropout rate reported by some clinical researchers, and that effective learning requires only a minimally aversive shock. Elsewhere (Feldman and MacCulloch, 1963) they operationalize this shock level as one which *S* indicates is very unpleasant as *E* gradually increases shock intensity. Shock intensity, therefore, appears to be an important consideration in clinical avoidance training. If the current is too low, learning may not occur. If the current is too high, avoidance of the training itself may occur as *S*s drop out of the program.

METHOD

Twenty-six homosexual men applying for a free research and treatment program were randomly assigned to either a 5-mA shock group or a self assigned current level group. *S*s in the self-assigned group indicated the maximum current they could tolerate as *E* progressively increased current flow. All but one *S* in the self-assigned group selected less than 5 mA as their shock level, and this *S* was included in the 5-mA group for statistical analysis.

The *S*s were recruited through a newspaper article, an advertisement in the personal column of the daily newspapers, and through community referrals. The *S*s are described in greater detail elsewhere (Tanner, 1973).

The training program was standardized with 20 sessions of 45 min each on commercially available automated equipment. The same slides were used for all *S*s and were not changed during the program. The program and slides are described more fully in Tanner (1972).

Change in penile circumference was used as the primary outcome measure since several authors have indicated that it is the most reliable or most valid measure of male sexual arousal (Bancroft, 1971; MacConaghy, 1971; Zuckerman, 1971). Changes in response to the male and to the female slides were combined in order to provide a single score in which a positive number indicated movement in a heterosexual direction, a negative number indicated movement in a homosexual direction, and zero indicated a lack of change. For each *S* the mean pre- to post-training change in mm for response to males was subtracted from the change for the response to female slides. A theoretical *S* who had a mean increase of 1.0 mm to female slides and a mean decrease of 1.0 mm to male slides would thus receive a composite score of +2.0, indicating overall movement in a heterosexual direction. If an *S* had increased an average of 1.0 mm to both female and male slides, he would receive a total score of zero, indicating no overall change in status. If he had decreased 1.0 mm in response to females and increased 1.0 mm in response to males, he would receive a total score of −2.0, indicating overall movement in a homosexual direction. In this way the scoring procedure also tended to cancel out fluctuations in general responsiveness, e.g. when *S*'s sexual deprivation varied from the pre- to post-assessment. All *S*s also rated their fear of electric shock by circling a number from 1 to 10 along a horizontal line, with the higher numbers respresenting greater fear. Since this was part of a larger study which included a comparison of avoidance learning with a waiting list control, half of the men were randomly assigned to immediate training, while half were assigned to a delayed training group with a wait of 8 weeks. The control *S*s were then offered the training, and are included in the present analyses.

RESULTS

Table 1 compares the total outcome scores for the six men receiving 5 mA stimulation with the six men receiving less than 5 mA stimulation. Since it was predicted that the higher current flow would improve learning, a one-tailed Mann–Whitney U was calculated, with $U = 7$ and $p = 0.047$.

TABLE 1. OUTCOME SCORES FOR MEN RECEIVING 5 mA STIMULATION AND MEN RECEIVING LESS THAN 5 mA STIMULATION

5 mA		Less than 5 mA	
S	Score	*S*	Score
2	+1.299	1	+0.097
4	+0.059	6	+0.066
5	+0.610	8	+0.133
7	+0.247	10	+0.123
16	+1.745	12	0.000
18	+0.236	14	+0.375

$U = 7, p = 0.047$; one-tailed test.

Table 2 compares the number of sessions attended by the 12 men receiving 5 mA stimulation with the number attended by the eight men receiving less than 5 mA stimulation. Since it was predicted that the higher current flow would result in a higher dropout rate, a one-tailed Mann–Whitney U was calculated, with $U = 31.5$ and $p = 0.0735$.

TABLE 2. NUMBER OF SESSIONS ATTENDED BY MEN RECEIVING 5 mA STIMULATION AND BY MEN RECEIVING LESS THAN 5 mA STIMULATION

5 mA		Less than 5 mA	
S	Number of sessions	*S*	Number of sessions
2	20	1	20
3	18	6	20
4	20	8	20
5	20	10	20
7	20	12	20
9	3	13	18
11	2	14	20
15	1	20	11
16	20		
17	2		
18	20		
19	1		

$U = 31.5, p = 0.0735$; one-tailed test.

Table 3 summarizes the relationship of fear rating and number of sessions attended by the twenty men who received at least one shock (six men dropped out before the first session). The Spearman Rank Correlation Coefficient for fear rating and number of sessions attended was $r_s = 0.44$, with $p = 0.05$.

TABLE 3. FEAR RATINGS AND NUMBER OF SESSIONS ATTENDED BY MEN RECEIVING AT LEAST ONE SHOCK

S	Fear rating	Number of sessions
19	1	1
20	1	11
12	2	20
18	2	20
5	2	20
11	2	2
6	3	20
16	3	20
2	3	20
4	5	20
10	5	20
3	5	18
1	5	3
7	6	20
6	6	1
18	6	2
14	7	20
8	8	20
13	9	18
1	10	20

$r_s = 0.44, p < 0.05.$

Table 4 summarizes the relationship of fear rating and current level selected by the nine men in the self assigned group. The Spearman Rank Correlation Coefficient for fear rating and shock level was $r_s = -0.64$, with $p = 0.05$.

TABLE 4. FEAR RATINGS AND CURRENT LEVELS OF MEN IN THE SELF ASSIGNED GROUP

S	Fear rating	mA
5	2	5
6	3	4
8	8	3
10	5	4
12	2	4
14	7	4
20	1	4.5
1	10	4
13	9	4

$r_s = -0.64, p < 0.05.$

Table 5 summarizes the relationship of fear ratings and outcome for the 12 men who completed training. The Kendall Correlation Coefficient for fear rating and outcome was $\tau = 0.256$, with $p = 0.1230$.

TABLE 5. FEAR RATINGS AND OUTCOME FOR MEN COMPLETING TRAINING

S	Score	Fear rating
12	0.000	2
4	0.059	5
6	0.066	3
1	0.097	10
8	0.113	8
10	0.123	5
18	0.236	2
7	0.247	6
14	0.375	7
5	0.610	2
2	1.299	3
16	1.745	3

$\tau = 0.256, p = 0.1230.$

DISCUSSION

The results support the earlier findings of animal research, that avoidance learning improves at higher shock intensities. Men receiving 5 mA of current showed greater change in a heterosexual direction than did men receiving from 3 to 4.5. mA of current ($p = 0.047$). The prediction of MacCulloch *et al.* (1971) that effective learning requires only a minimally aversive stimulus was, therefore, not supported.

MacCulloch also predicted that high shock intensity would result in a higher dropout rate. However, the number of sessions attended by men receiving 5 mA of current did not differ significantly from the number attended by men receiving less than 5 mA ($p = 0.0735$). Still, the difference may be great enough to warrant some consideration in clinical applications of avoidance learning.

One way to handle the problem of maximizing training effects (which requires high shock intensities) while minimizing the probability of dropping out of training (which may require low shock intensities) is to assign current level according to a *S* variable. The number of sessions attended was found to correlate significantly with *S*s' fear ratings before training ($p = 0.05$). The higher a man's fear rating, the fewer sessions he was likely to attend. In addition, when *S*s were allowed to select their own shock intensity, fear ratings correlated significantly with current level ($p = 0.05$). The higher a man's fear rating, the lower was his current level.

Since the men who completed training had a median fear rating of 4.0, while the men who dropped out had a median rating of 5.0, I suggest assigning a current flow of 5 mA to all men with a fear rating of 4 or less, while allowing men with a fear rating greater than 4 to select their own shock intensity. In addition, since most men who dropped out of training after receiving at least one shock did so comparatively early (mean sessions attended before dropping out = 7), the current level could be increased after the seventh session for those men who select their own shock intensity. Current flow might be boosted by 25 per cent or 5 mA, whichever is less, beginning with the eighth session.

The selection of a 5-mA maximum may be premature, since up to 10 mA has been reported with human avoidance training with no apparent ill effects (Birk *et al.*, 1971) and Craven (1970) has stated that a minimum of 20 mA is required for a prolonged period before

painful muscular contraction will occur. I selected 5 mA as the maximum current in my work simply because I personally could tolerate little more than that, and the proposed research ethics of the American Psychological Association recommend that *E* stimulate himself before each training session to insure that his equipment is in working order (American Psychological Association, 1971).

Since fear of shock was related to dropout rate as well as to shock intensity, and since shock intensity was related to outcome, the relationship of fear and outcome was also examined. The Kendall Correlation Coefficient for fear rating and outcome was, however, not significant ($p = 0.1230$).

Other program and *S* variables need to be examined in order to maximize training effects. Half of the *S*s in the present study, for example, have been offered five additional 'booster' sessions during the year following termination. These men will be compared at the 1-yr follow-up with men who had no booster sessions, and with men who dropped out of training. Until these variables have been investigated thoroughly, clinicians ought to be skeptical of statements regarding the most effective way to modify behavior, in order that such statements do not hinder empirical investigations and result in prematurely rigid training procedures.

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