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Abstract

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Covert negative reinforcement (CNR) was intially proposed by Cautela (1970a) as a clinical procedure for increasing the frequency of a desired client response. CNR is "covert" in that both the aversive stimulus and the contiguous target behavior are imagined by the client. Thus, the therapist describes in detail the unpleasant or aversive stimulus, while the client imagines the stimulus. When the image is clear, the client is instructed to "shift" to a scene of himself performing the behavior to be increased. Inasmuch as "escape" from the aversive stimulus is reinforcing, the target behavior should be increased. Note, however, that this procedure only approximates negative reinforcement, since the target response simply follows the aversive stimulus rather than being instrumental in its termination.

Covert negative reinforcement has been viewed as particularly suitable for clients who have difficulty imagining positive visual scenes, thereby precluding the use of covert positive reinforcement (Cautela, 1970b). Cautela found that many clients who were unable to imagine positive scenes had no difficulty with aversive scenes, and he speculated that imagined target behaviors could be increased using negative as well as positive reinforcement. Cautela reports that this procedure has been used successfully in the treatment of such maladaptive approach behaviors as smoking marijuana, homosexuality, and obesity. However, it is viewed as being especially appropriate in treating maladaptive avoidance behaviors, and success is reported with school phobia, impotence, fear of leaving the house, and a fear of breezes (Cautela, 1971).

As in all covert conditioning procedures, a major assumption of CNR is that increases in the desired covert response will transfer to the desired overt response. It is further assumed that covert behavior, in this case a visual image, can be influenced in a manner identical to overt behavior, e.g., through negative reinforcement.

To test these assumptions, Ascher and Cautela (1972) indirectly investigated the effects of covert negative reinforcement on a simple laboratory task. Three training procedures were used which were expected to differentially influence subjects' size estimates of circle diameters in the test phase of the experiment. The results indicate that covert negative reinforce-

ment, or, more specifically, a stimulus (cue word), previously associated with termination of aversive imagined scenes, can influence responses upon which it is made contingent. However, because the Ascher and Cautela study did not control for the effects of the feedback value of the cue word, which was used contingently during the test phase of the study to influence subjects' size estimates, their conditioning explanation can be seriously questioned.

Ascher and Cautela employed a covert negative reinforcement group and two control groups. In the CNR group, subjects were asked to imagine a noxious scene and then to "shift" to an image of a ringing bell when E said the word "bell." They were told that as they imagined the ringing bell, "The noxious scene will disappear, and all that will remain is the sound of the ringing bell (p. 2)." During the test phase of the experiment, E said the word "bell" contingent upon Ss' over- or under-estimations of circle diameters, in an attempt to influence the size estimates of diameters.

Control group A was included to control for the effects of imagery training. Therefore, the experimental procedure was identical to the CNR group for control group A, except that images were not paired during training. (Ss imagined a ringing bell for 30 trials and then a noxious scene for 30 trials). Subjects in control group B received no imagery training, and during the test phase were used as "matched controls; they were reinforced in a manner identical to their matched experimental partners (p. 3)." That is, the word "bell" was stated following size estimates of diameters on a non-contingent basis for Ss in group B. The purpose of a non-imagery control group receiving non-contingent feedback for task performance is unclear. The fact that a non-imagery control group designed to control for the information value of the cue word "bell" was not included obscures the results of the study.

To date, Ascher and Cautela's is the only study attempting to empirically investigate the efficacy of CNR. Insofar as all covert conditioning procedures (Cautela, 1971) are based on the same assumptions, empirical support for CNR lends credence to other covert conditioning procedures. In light of the dearth of empirical support for covert conditioning, Mahoney (1972) and Johnson and Elson (1974) have asserted that replications of key studies such as this one are needed to help establish their validity. Thus, the purpose of the present study was to replicate the Ascher and Cautela experiment, with one small but significant procedural difference, namely, to replace the

matched control group with an information-feedback control group

Method

Thirty undergraduate students enrolled in an introductory psychology class at a small college in mid-Michigan were given extra-credit for volunteering for this experiment. Both males and females participated. Subjects were randomly assigned to one of three groups (n=10).

The procedures are identical to those in the original study. Each subject was individually involved in both a training phase, which was different for the three groups, and a test phase, which was identical for all subjects. In the training phase, experimental Ss were given a standard set of instructions (see Ascher and Cautela, 1972). Essentially, they were asked to select, think about, and describe the most noxious situation they had ever experienced. They were then asked to imagine the scene, while E embellished their image with a verbal description of the scene. Further, the Ss were prompted to use all five senses in imagining the scene and were asked to signal E by raising an index finger when the scene was clear. After letting S imagine the scene for several seconds, E questioned S about the clarity of the scene and verbally reinforced all indications of clarity. Suggestions were also made for greater imagery vividness.

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Control group A was used to control for the effects of imagination training. Thus, each subject was asked to imagine a ringing bell on 30 successive occasions and then to imagine a noxious scene on 30 successive occasions. Note that the bell and the noxious scene were not paired. Imagery trials were separated by 15-second intervals.

Control group B served as an information control, and Ss in this group received no imagery training whatsoever. They were, however, informally interviewed by E for approximately the same amount of training time received by

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Following the training phase, each S was taken to a darkened room, where he/she was exposed to a series of circles projected by a 35mm slide projector onto a screen approximately 15 feet away. A total of six circles, whose diameter ranged in size from four to nine inches in one-inch increments, comprised the experimental stimuli. Each circle was presented to each subject three times, under three different conditions. Thus, in the baseline condition, as well as in the over- and under-estimation conditions, each subject was exposed to 18 circles.

Prior to the presentation of the stimuli, S was given the following instructions. "You are going to see a series of circles. I want you to estimate the size of their diameters in inches." After each response, each circle remained exposed for approximately five seconds.

During the baseline condition, the 18 circles were presented without comment by E. Responses were recorded, and means were computed for each circle. The mean response to each of the six circles was used to determine if responses in the next two conditions were either over- or under-estimates. During the over-estimation condition, E stated the word "bell" each time S over-estimated a circle relative to the mean of the baseline responses. Likewise, the word "bell" was stated by E after each under-estimation in the under-estimation condition. These last two conditions were counterbalanced, so that half of the Ss in each group were in the over-estimation condition first, and half were in the under-estimation condition first. A buffer set of 18 slides was presented between the over- and under-estimation conditions, during which E made no comments, and responses were not recorded.

Results

Group means for each condition are presented in table I.

TABLE I. MEANS OF CIRCLE-SIZE JUDGMENTS FOR THE THREE EXPERIMENTAL CONDITIONS WITHIN THE THREE SUBJECT GROUPS

	Baseline	Under	Over
EX	5.79*	6.16	5.57
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Means were computed by summing over all subjects and all responses in each condition and then dividing by the number of subjects per cell (10) and the

number of responses per condition (18). Thus, the data presented in table I represents the average response of all subjects in each condition.

Inspection of the results indicates that there was no systematic effect of the word "bell" upon responses, regardless of type of training received. In fact, the means in the experimental condition are opposite to the predicted direction. The large differences between group B estimates and the estimates of the other two groups is very likely due to two subjects in group B whose estimates of circle diameters ranged from one inch to four inches, thereby depressing the mean estimates.

Discussion

The results of the present experiment are at variance with those obtained in the original study. It is conceivable that these differences may be due to possible procedural variations between the two studies. Because Ascher and Cautela's description of their procedures was cursory, and although every effort was made to duplicate those procedures, the possibility of differences in imagination training cannot be precluded. For example, Ascher and Cautela may have spent more time during the training phase embellishing the noxious scene for Ss in the original study than was spent in the present study. If that is true, and if escape from more vivid scenes results in more reinforcing value for the word "bell," then use of the word "bell" during the test phase might have influenced Ss responses to a correspondingly greater degree.

A second possibility is the unlikely one that differences in the population from which the subjects were drawn were substantial enough to result in the differential responsivity of the subjects to the task. This seems improbable, since both groups of subjects were male and female college students, ranging in age from late teens to early twenties. Both these procedural possibilities appear to have little explanatory credibility.

A more fruitful inquiry into these discrepant results might be to ask why the original investigators obtained the results that they did. Ascher and Cautela postulate several alternative explanations for their results. One explanation is that the Ss had hypotheses about the purpose of the study which influenced their behavior. However, the authors note that procedures such as (a) obscuring the purpose of the study, (b) not answering questions until the experiment was concluded, and (c) using an ambiguous task which is difficult to fake, were used to prevent experimental demand characteristics. Further, a post-experimental interview revealed that subjects were not aware of the contingencies used in the test phase of the study. In addition, if demand

characteristics were operative, then the results of the two studies should have been similar.

Another explanation of the original results is that the use of the word "bell" was of sufficient reinforcement value to influence Ss' responses. Although Ascher and Cautela dismiss this explanation, it seems a plausible one, because a control group was not included to test it. One purpose of the present study was to control for just that possibility. However, the inability of the present study to find any systematic group differences precludes the possibility of investigating this hypothesis.

Another avenue of inquiry involves the operations employed in the experiment to test covert negative reinforcement. Ascher and Cautela assumed that the word "bell" would gain secondary reinforcing properties as a result of its contiguous association with the termination of the noxious scene. Thus, its later use in attempting to influence subjects' responses would have been enhanced beyond mere feedback value.

As pointed out earlier, this is an indirect test of CNR and rests on the assumption that a secondary reinforcer can be established by negative reinforcement-type operations. However, the available experimental literature on attempts to produce reinforcement value in a neutral stimulus by simply introducing it when an aversive stimulus ends is equivocal (Nevin, 1973). As Ascher and Cautela note, some investigators have been able to establish secondary reinforcers using escape conditioning, while others have not. Inasmuch as the animal literature fails to yield consistent results in this phenomenon, it is not surprising that experiments dealing with human imagery would also be inconsistent.

Consequently, it could be argued that the present investigation has not been an investigation of covert negative reinforcement but rather a test of an inadequate analogue of CNR. Therefore, results cannot be taken as either supportive of or damaging to the assumptions underlying CNR; rather, they can be seen as typical of previous research inconsistencies involving laboratory investigations of conditioned negative reinforcement.

One final possibility can be offered, namely, that the operative component in all covert conditioning procedures is covert modeling (e.g., Flannery, 1972a; 1972b). Mahoney (1974) has noted that covert conditioning requires that the client imagine himself engaging in successive approximations of the target behavior. The efficacy of simply imagining oneself performing new or difficult behaviors appears to be clearly established (Donaldson, 1972;

Meichenbaum, 1972; Kazdin, 1973a; 1973b). Thus, the clinical utility of CNR may simply involve the covert modeling portion of the procedure, rendering the noxious scene irrelevant.

A feasible speculation regarding the results of the present experiment is that since covert modeling was not a part of the procedure, subjects' responses could not be influenced. This explanation cannot, however, account for the positive results of the earlier study. Future investigations of CNR should attempt to isolate the effects of covert modeling from covert negative reinforcement. Further, more clinically relevant dependent variables should be employed.

Essentially, this study has failed to replicate the results of a key covert conditioning experiment. Several explanations of both the failure of the present study and the positive results of the original study were offered. Ultimately, the clinical utility of covert negative reinforcement will be established by comparative group studies investigating its effects upon clinically relevant subject behavior. Thus, it is apparent that neither study discussed here can be viewed as conclusive. However, the fact that the results of the original study could not be duplicated underscores the need for further research, to include replications of key covert conditioning studies.

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Meichenbaum, 1972; Kazdin, 1973a; 1973b). Thus, the clinical utility of CNR may simply involve the covert modeling portion of the procedure, rendering the noxious scene irrelevant.

A feasible speculation regarding the results of the present experiment is that since covert modeling was not a part of the procedure, subjects' responses could not be influenced. This explanation cannot, however, account for the positive results of the earlier study. Future investigations of CNR should attempt to isolate the effects of covert modeling from covert negative reinforcement. Further, more clinically relevant dependent variables should be employed.

Essentially, this study has failed to replicate the results of a key covert conditioning experiment. Several explanations of both the failure of the present study and the positive results of the original study were offered. Ultimately, the clinical utility of covert negative reinforcement will be established by comparative group studies investigating its effects upon clinically relevant subject behavior. Thus, it is apparent that neither study discussed here can be viewed as conclusive. However, the fact that the results of the original study could not be duplicated underscores the need for further research, to include replications of key covert conditioning studies.