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VICARIOUS CLASSICAL CONDITIONING AS A FUNCTION OF AROUSAL LEVEL [1]

ALBERT BANDURA AND THEODORE L. ROSENTHAL

Stanford University

This study investigated the effects of emotional arousal, manipulated both psychologically and physiologically, on vicarious conditioning processes. 5 groups of observers underwent procedures designed to induce differential degrees of arousal. The observers then participated in a vicarious aversive conditioning paradigm in which a model exhibited pain cues in conjunction with an auditory stimulus, and the acquisition and extinction of observers' emotional responses to the conditioned stimulus were studied. The results disclosed that vicarious conditioning is positively related to degree of psychological stress; a monotonic decreasing function is obtained when, in addition to situational stress, Ss experience increasing physiologically induced arousal. There is also some suggestive evidence that the disruptive effects of high levels of arousal may be mediated by self-generated competing responses designed to neutralize the aversiveness of the vicarious instigation situation.

Increasing attention has been drawn in recent years to the influential role of vicarious experiences in the social-learning process. Most relevant research, however, has been essentially confined to the transmission of instrumental classes of responses as a function of exposure to real-life or symbolic models (Bandura, 1962, 1965; Bandura & Walters, 1963). Vicarious classical or respondent conditioning, on the other hand, has received surprisingly little experimental attention despite ample evidence from informal observation that emotional responses are frequently acquired through observation of the pain and fear reactions exhibited by other persons exposed to aversive stimuli; conversely, positive incentive learning may also occur on a vicarious basis by observing others experiencing positive reinforcement in contiguous association with discriminative stimuli.

In laboratory investigations of vicarious classical conditioning (Barnett & Benedetti, 1960; Berger, 1962), one person, the performer or model, typically undergoes an aversive conditioning procedure in which a formerly neutral stimulus is presented, and shortly thereafter the model displays pain cues and other emotional reactions supposedly in response to an unconditioned aversive stimulus. If an observer witnesses the model undergoing this conditioning procedure, the observer will also begin to exhibit emotional responses to the conditioned stimulus alone, even though he has not himself experienced the aversive stimulation directly.

Although the process of vicarious conditioning has been clearly demonstrated (Berger, 1962), wide interindividual variability has been noted in the acquisition rate and stability of vicariously acquired conditioned responses. Since this process, which is most likely mediated through stimulus generalization, requires the observer to experience vicariously another person's pain responses, thereby producing emotional arousal in the observer, it seems plausible to hypothesize that variables which influence an observer's general level of emotional arousal will partly determine the rate and stability of vicarious learning.

There are numerous investigations of aversive classical conditioning as a function of subjects' arousal level in which arousal is either manipulated directly by varying the intensity of the unconditioned stimulus or assessed in terms of personality measures of emotional responsivity. Typically these studies have shown that conditioned responses are developed more rapidly and, once acquired,

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extinguish less readily under conditions of high, as compared to low, arousal (Doerfler & Kramer, 1959; Spence, 1958, 1964). From the latter findings it might be expected that vicarious conditioning would likewise be positively related to degree of psychologically induced arousal.

A considerable body of recent experimentation exploring the interaction of social-stimulus and physiological determinants of emotional states (Schachter, 1964; Schachter & Singer, 1962; Schachter & Wheeler, 1962) indicates that administration of epinephrine, a sympathetic stimulant, may enhance persons' susceptibility to modeling influences. In particular, given epinephrine arousal without accurate information of its side-effects, subjects displayed much greater matching of models' aggressive, euphoric, and jocular behavior than subjects who were exposed to these models without prior physiological arousal or were given a sympathetic depressant.

Findings from studies concerning the effects of autonomic arousal on fearful and avoidant behavior, although not employing modeling procedures, nevertheless have implications for the vicarious instigation and acquisition of affective responses. Singer (1963), for example, found at the infrahuman level that rats injected with epinephrine displayed considerably more fear in response to aversive stimuli than did placebo- or chlorpromazine-injected animals. However, available evidence (Latané & Schachter, 1962) indicates that acquisition of emotional responses through direct aversive conditioning is significantly influenced by the dose level of adrenalin employed: Small doses of adrenalin generally facilitate avoidance conditioning, whereas large doses have negligible effects on avoidance behavior, suggesting a nonmonotonic relationship between autonomic arousal and conditioned emotional responses.

The present experiment was designed to explore the effects of varying degrees of arousal, manipulated both psychologically and physiologically, on vicarious conditioning processes. Subjects participated in a vicarious aversive conditioning paradigm in which a model emitted pain cues in conjunction with an auditory conditioned stimulus, and the observers' acquisition and extinction of autonomic responses to the conditioned stimulus were studied. The following treatment conditions were included in the experiment:

1. No injection-nonthreat condition. These observers were subjected to no direct experiences of an emotion-provoking sort, and consequently provide an index of vicarious conditioning under relatively low arousal.

2. Placebo injection. Subjects in this condition received a placebo hypodermic without any knowledge of its contents which, for most subjects, constituted a moderately anxiety-arousing experience.

3. Placebo injection plus threat of aversive stimulation. This group of observers, which also received the placebo injection, was informed that following the conditioning of the model, they too would undergo the painful shock stimulation. The threat of impending shock was designed to induce an additional increment of emotional arousal.

4. Epinephrine-induced arousal: Small dose. Observers assigned to this group received a dose of epinephrine sufficient to produce a noticeable physiological effect.

5. Epinephrine-induced arousal: Large dose. The dosage level employed in this condition was capable of producing sizable sympathetic arousal.

The two sets of operations thus provide three degrees of psychologically induced emotional arousal (i.e., nonthreat, placebo injection, placebo injection plus shock threat) and three points on a physiological arousal continuum (epinephrine dosage of .2 and .5, with the placebo injection condition serving as a 0 dosage group).

Individuals have been shown to differ markedly in their predispositions to emotional responsivity under conditions of aversive stimulation. To the extent that vicarious learning is partly governed by arousal level, the rate of conditioning is likely to reflect the combined effect of momentary states of arousal and emotional proneness. Therefore, in order to test for expected interactive effects of response-defined proneness to emotionality and experimentally induced arousal on vicariously acquired responses, the subjects in the experiment were administered a measure of emotional proneness.

Since emotional response predispositions are unlikely to be activated under nonthreatening conditions, no relationships between the personality and the conditioning measures were expected among subjects in the low-arousal group. On the assumption that the experimental manipulations would be sufficiently emotion-provoking to elicit existing differential dispositions but insufficient to evoke debilitating levels of arousal, it was anticipated that emotionality and vicarious conditioning would be positively related in the stressful treatment conditions.

METHOD

Subjects

A total of 100 paid volunteers, 20 in each treatment condition, participated in the experiment. Because use of injection procedures required subjects' written consent, the study was confined to college students who were 21 years of age or older.

Procedure

The subjects first reported individually to the Psychology Department, where they were led to believe that the study for which they had volunteered was concerned with the effects of certain common, but unspecified, drugs upon psychomotor performance. Based on preliminary information, several cases were excluded because of physical contraindications, and four volunteers withdrew from the experiment because they had marked fears of hypodermic injections. During this initial session the subjects signed, in the presence of witnesses, a legalistic statement releasing the experimenters from any liability. In order to reinforce further the set that the subjects would, in fact, receive injections of pharmacologically active agents, all subjects except those in the no injection-nonthreat group were informed that some effects of the drugs might persist beyond the test period, and for this reason they were cautioned against strenuous activities or engaging in any endeavors requiring special skills or fine coordination for at least 12 hours after the experimental session. In addition, subjects completed the Taylor Manifest Anxiety (*MA*) scale to provide a measure of emotional proneness, and were then instructed to report several days later to the Stanford Medical Center where they would be tested in pairs for reasons that would be explained then.

With subjects assigned to the no injection-nonthreat group, there was no mention of drugs, nor were they asked to sign the ominous medical-liability form. To further reduce any possible situational stress, these subjects were told that the experiment was being conducted in the medical setting simply because the laboratory equipment was located there.

In the second session of the study, in order to enhance the credibility of the situation, the experimenter's confederate,[2] a male college student who served as the model for all subjects, timed his appearance at the laboratory either to coincide with, or to follow, the arrival of the subject. After preliminary introductions, the experimenter announced that the model had been assigned on a random basis to the "pain-emotion" condition, whereas the subject would simply serve as his matched control to provide a base line during the session for physiological response to the particular drug, independent of any painful stimulation. The experimenter then asked the model whether he had any objections to receiving relatively painful shocks of moderate intensity since effects of both pharmacological and pain-producing factors on perceptual-motor coordination were being studied. After exhibiting mild hesitancy, the model expressed his willingness to undergo the procedures. In order to counteract any possible self-induced emotional arousal, should the observer expect that he might also be the recipient of aversive stimulation, the model asked whether electric shocks would be administered both to him and to his partner. The experimenter repeated that the observer was a control subject and, therefore, would not be shocked at any time. Subjects in the shock-threat condition, however, were informed that they would be subjected to the same painful stimulation following the completion of the model's performance.

The experimenter then ushered the model off, supposedly to receive his drug injection. After the lapse of an interval equivalent to that required to administer the hypodermic, the model returned to the experimental room buttoning his left shirt-sleeve. The subject was then sent to the physician for a brief examination and the injection. The necessity for following a double-blind procedure in drug research was the reason offered to justify keeping the participants uninformed about the nature of the pharmacological agents being administered.

For subjects in the no-injection condition, the vicarious conditioning phase of the experiment commenced immediately upon the model's return.

Injections. Subjects in the placebo and the shock-threat conditions received a subcutaneous injection of .5 cubic centimeter of saline solution.

The epinephrine dosages were selected primarily on the basis of findings from other experiments (Clemens, 1957; Schachter & Singer, 1962), that have employed different levels within the effective dose range. Subjects in the epinephrine-large dose condition received a subcutaneous injection of .5 cubic centimeter in 1:1000 saline solution, which is sufficient to produce sizable physiological arousal. In the epinephrine-small dose condition, the subjects received a subcutaneous injection of .2 cubic centimeter in 1:1000 saline. The conditioning phase of

[2] The authors are grateful to Perry Seiffert for his devoted services in the role of the pseudosuffering model.

the experiment was begun approximately 5 minutes after injection.

Vicarious conditioning. While the subject was receiving his injection, GSR electrodes were affixed to the fingers of the model's left hand to maintain verisimilitude, and dummy shock electrodes were attached to the wrist of the model's right hand. After the subject entered the experimental room he was seated comfortably in a chair positioned to provide a clear right-side view of the model. A GSR bipolar pickup device—$\frac{5}{8} \times 1$ inch electrodes bent to the contours of the subject's index and third fingers coated with electrode paste—was then firmly taped to the fingers of the left hand.

Resting on the table immediately in front of the model was a pursuit-rotor apparatus which served as the cover task for presenting the conditioned stimulus-unconditioned stimulus (CS-UCS) pairings to the model. This particular orienting task was selected because it could be effectively utilized to channel the subject's observing responses and to enhance the pain-response cues emitted by the model. The experimenter explained to the model, as though he were a naive subject, that the apparatus provided a sensitive measure of motor coordination. He was instructed to keep the end of the stylus on the small target circle located on the turntable as best he could, while the turntable revolved. It was further explained that at periodic intervals a buzzer would sound, and shortly thereafter a moderately painful shock would be administered to the model's right hand, although he might not receive a shock every time the buzzer sounded. The observer, in turn, was asked to sit quietly and to observe closely the model's performance, ostensibly to duplicate the model's task-relevant stimulation but, in fact, to ensure the occurrence of the necessary observing responses.

After the injection and the presentation of instructions, the adaptation phase of the experiment was begun. The purpose of this phase was to neutralize any aversive properties of the buzzer, which served as the CS, and to allow observers to adapt to the apparatus and procedures. The adaptation series consisted of repeated presentations of the CS alone until the observer failed to exhibit any responses on three consecutive trials.

The adaptation phase was followed immediately by the vicarious acquisition series consisting of 10 conjoint presentations of the CS and the model's pain responses. In each of these trials the buzzer was sounded and approximately .5 second after the onset of the CS the model suddenly flexed his right arm, dropped the stylus and winced, creating the impression that a painful shock had been delivered. These pain reactions were convincingly feigned and no shocks were in fact administered to the model. Six CS-alone trials were interspersed among the 10 vicarious acquisition trials as tests of the degree to which the CS was accruing conditioned aversive properties. During the test trials the buzzer was sounded, but the model exhibited no response whatsoever. The order of the test trials was 2, 6, 9, 10, 12, and 15. At the completion of the acquisition-test series all subjects were given 10 extinction trials in which the CS was presented alone.

TABLE 1

DIFFERENCES IN PHYSIOLOGICAL REACTIONS REPORTED BY GROUPS OF SUBJECTS RECEIVING INJECTIONS AND IN MEAN SKIN CONDUCTANCE LEVELS

Treatment conditions	Number of subjects reporting reactions	Number of reactions reported	Conductance levels (in microohms)	
			Pre-adaptation	Post-adaptation
Epinephrine .5	20	46	14.1	15.0
Epinephrine .2	14	26	15.4	16.4
Shock-threat	7	8	15.9	18.4
Placebo	3	4	14.9	18.9
Nonthreat			18.1	20.9

Intertrial intervals at each phase of the experiment were varied systematically in an irregular fashion within 15–40 seconds. The total time elapsing between the beginning of the adaptation and completion of the extinction series was approximately 15 minutes.

The experiment was concluded by having the subjects complete a questionnaire in which they recorded the somatic reactions that they experienced following the injection, checked on graphic rating scales both the severity of shocks administered to the model and the amount of discomfort produced by his pain reactions, and described their thoughts and response during the period when the model was subjected to the aversive stimulation.

Vicarious Conditioning Scores

The observers' skin resistance was continuously recorded on the Grass Model 5 polygraph; GSR responses were defined as a change in the direction of lowered resistance of 2000 ohms or greater occurring within 5 seconds of the CS onset. The polygraph records were scored independently by the experimenter and a second judge who scored 25% of the records, drawn at random from each of the treatment conditions, without knowledge of the subjects' group assignments. The scorers agreed on 97% of the trials concerning the presence or absence of a GSR response.

RESULTS

As an independent check on whether or not the injections had in fact produced differential degrees of sympathetic arousal, the subjects' questionnaire data were scored for the frequency of different physiological reactions which are typically associated with epinephrine (i.e., palpitation, tremor, flushing, and accelerated respiration). As shown in Table 1, there were substantial differences both in

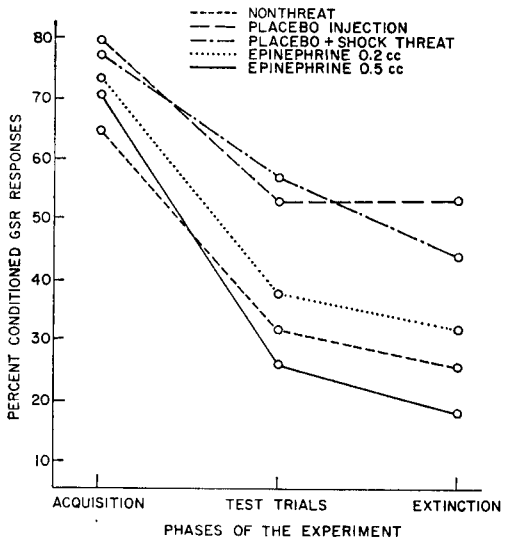

FIG. 1. Mean percentage conditioned GSR responses exhibited by subjects on each of three test periods for each of five treatment conditions representing differential levels of arousal.

the total number of subjects in each treatment condition who reported reactions indicative of high arousal, and in the total amount of reactivity. Analysis of variance of the latter scores by means of the Kruskal-Wallis test reveals that the differential effects produced by the experimental procedures are highly significant ($H = 41$, $p < .001$). Further intergroup comparisons based on the Mann-Whitney U test show that the epinephrine .5 subjects experienced more physiological reactions than the epinephrine .2 group ($p < .01$), and both groups of subjects receiving placebo injections ($p < .001$). The epinephrine .2 condition, in turn, produced higher scores than either the placebo ($p < .001$) or the shock-threat group ($p < .01$), which did not differ from each other.

Measurements of skin conductance level taken immediately prior to, and following completion of, the adaptation series are reported in Table 1. Analysis of variance of both sets of scores disclosed no significant differences. Nor did the groups of subjects differ in their estimates of the number and severity of shocks administered to the model, the degree of pain experienced by the performing model, and the amount of empathy that they felt for their suffering counterpart.

Trials to Adaptation

The number of trials required to neutralize the subjects' responses to the CS varied closely around a mean value of 17.5. Analysis of variance of the adaptation data revealed no significant difference among treatment conditions. Thus, the arousal manipulations did not produce any systematic differential responsivity to the CS prior to the conditioning process.

Acquisition Series

Figure 1 shows the percentage of the total number of conditioning trials in which subjects from the various groups exhibited GSR responses. Since the sets of scores for the acquisition, the test for conditioning, and the extinction series departed from normality, nonparametric techniques were employed in estimating the statistical significance of the obtained differences.

As shown in Figure 1, subjects in all groups displayed a high frequency of GSR responsivity to the stimulus complex containing both the CS and the model's pain cues. Analysis of variance performed on these data by means of the Kruskal-Wallis test revealed no significant group differences (Table 2) in this phase of the experiment.

TABLE 2

SIGNIFICANCE OF DIFFERENCES IN CONDITIONED RESPONSES BETWEEN AROUSAL CONDITIONS

Experimental phases	χ^2	p	Comparison of treatment conditions (p values)									
			Placebo versus non-threat	Placebo versus shock threat	Placebo versus epineph-rine .2	Placebo versus epineph-rine .5	Non-threat versus shock threat	Non-threat versus epineph-rine .2	Non-threat versus epineph-rine .5	Shock threat versus epineph-rine .2	Shock threat versus epineph-rine .5	Epineph-rine .2 versus epineph-rine .5
Acquisition	6.48	*ns*										
Test trials	8.60	<.05	*ns*	*ns*	*ns*	>.10	<.025	*ns*	*ns*	*ns*	<.02	*ns*
Extinction	14.73	<.01	<.01	*ns*	.10 >p >.05	<.002	<.05	*ns*	*ns*	*ns*	.002	*ns*

TABLE 3

RANK CORRELATIONS BETWEEN EMOTIONAL PRONENESS AND VICARIOUS CONDITIONING SCORES FOR EACH OF THE FIVE TREATMENT CONDITIONS

Conditioning scores	Treatment conditions				
	Nonthreat	Placebo	Shock-threat	Epinephrine .2	Epinephrine .5
Test for acquisition	.18	−.23	.09	.51*	−.45*
Extinction	.07	−.10	.06	.50*	−.62**

*$p < .05$.
**$p < .01$.

Test for Conditioning

During the acquisition series, particularly in the initial trials, observers' emotional responses are most likely elicited directly by the model's pain reactions. Consequently, demonstration of vicarious conditioning effects requires the occurrence of conditioned responses to the CS in the absence of the model's behavior. As can be seen from Figure 1, the auditory stimulus itself had acquired differential aversive properties among the groups of observers subjected to varying degrees of arousal. The overall differences yield a significance value beyond the .05 level (Table 2). Further comparisons of pairs of scores by the Mann-Whitney *U* test reveal a significantly higher rate of conditioned responses among subjects in the shock-threat condition relative to both the low aroused no-injection group, and the high aroused epinephrine-large dose group, which do not differ from each other. Observers in the placebo condition also displayed a higher level of conditioning than subjects in the .5 epinephrine group, although the latter difference is slightly below the .10 significance level.

Extinction

The differential vicarious conditioning noted in the test trials becomes even more pronounced in the extinction phase of the experiment (Table 2). Observers in both the placebo and the shock-threat groups continue to exhibit a significantly higher level of conditioned responses than either the no-injection or the .5 epinephrine groups. Although the two sets of data yield essentially the same relationships between arousal and vicarious conditioning, the relative positions of the shock-threat and placebo treatment conditions are reversed so that the extinction comparisons involving the latter group yield differences of larger magnitude, and even a differentiation at a borderline level of significance from the .2 epinephrine group.

Emotional Predisposition and Vicarious Conditioning

In order to determine the degree of relationship between predisposition to emotional arousal and vicarious conditioning, the *MA* scale scores, which were comparable across conditions, were correlated separately within groups by the rank-order method with the measures of acquisition and extinction. The obtained correlation coefficients (Table 3), corrected for tied ranks, disclose no significant relationships between the two sets of variables in the no-injection, placebo, and shock-threat condition, but moderately high positive covariations for subjects receiving the .2 dose of epinephrine. By contrast, emotional predisposition was highly negatively correlated with vicarious conditioning under conditions of high physiological arousal.

DISCUSSION

The present experiment provides further evidence that conditioned emotional responses can be transmitted vicariously. In addition, the overall findings reveal that observers' emotional arousal is a significant determinant of vicarious conditioning. This is shown in the fact that frequency of conditioned responses is a positive function of the degree of psychological stress. However, a monotonic decreasing function is obtained when, in addition to situational stress, subjects experience increasing physiologically induced arousal.

If it can be assumed that the five treatment conditions represent increasing levels of emotional arousal on a single dimension, then the combined results suggest an inverted U relationship between arousal level and vicarious conditioning. There are two sets of data that lend some support to this interpretation. It will be recalled that the shock-threat condition yielded the most significant differences in acquisition scores, but the placebo condition emerged superior in the extinction phase of the experiment. This reversal is probably due to the fact that the threat of impending shock stimulation produced a further heightening of emotional arousal in shock-threat observers as they entered the extinction series of trials. Results based on the within-treatments correlational analyses disclose that emotionality and vicarious conditioning are essentially unrelated at low and moderate levels of arousal, positively correlated as arousal is further increased, and highly inversely related under conditions of strong physiological arousal, suggestive of a nonmonotonic relationship.

The failure of the low-aroused subjects to exhibit much vicarious conditioning is readily explainable in terms of an activation hypothesis, but the equally poor conditioning in subjects administered the large dose of epinephrine may suggest alternative interpretations. One possible explanation is that epinephrine in the high dosage range has an inhibitory effect on the GSR response itself. This interpretation, however, cannot account for the differential conditioning rates, since no significant differences were obtained among groups in both the total number of trials to adaptation, and the frequency of GSR responsivity during acquisition when the stimulus complex contained both the CS and the model's pain cues. Moreover, the fact that test trials were interspersed with acquisition trials, and the entire conditioning series was completed in a relatively brief period of time, rules out the possibility of any significant temporally related changes in drug action. Finally, if epinephrine had a suppressive effect on the GSR response, this outcome would have precluded high correlations between emotional responsivity and vicarious conditioning.

Although the overall findings provide evidence of a relationship between arousal level and vicarious conditioning, the manner in which arousal produces facilitative or disruptive effects remains to be demonstrated. Subjects' replies to the postexperimental questionnaire suggest that disruptive effects may, in part, be mediated by self-generated competing responses designed to reduce the aversiveness of the vicarious instigation situation. In some cases this took the form of an intensive focus on irrelevant external stimuli, to the exclusion of the disturbing pain cues ("When I noticed how painful the shock was to him I concentrated my vision on a spot which did not allow me to focus directly on either his face or hands.") Other subjects engaged in an extended series of avoidant responses in an effort to find one that would be effective in reducing their discomfort ("The first 3 or 4 shocks, I thought about the amount of pain for the other guy. Then I began to think to minimize my own discomfort. I recall looking at my watch, looking out the window, and checking things about the room. I recall that the victim received a shock when I was thinking about the seminar, and that I didn't seem to notice the discomfort as much in this instance.") Like the latter subject, most observers attempted to decrease the aversive stimulation arising from the model's pain reactions by conjuring up competing cognitive responses ("I tried to think of other topics; general elections in Britain, will Wilson become a Prime Minister, academic problems, planned trip to New York. I was not able to keep thinking on any topic too consistently and my thoughts rather broke down after a while. . . ." "I tried to be cool. I thought about Latin verbs and about Latin compositions."). A few subjects, however, marshaled considerably more potent contravening cognitive responses ("I finally just tried to think about the girl I slept with last night. It kept my mind off those damn shocks."). To the extent that an observer who is confronted by a vicarious instigation situation succeeds either in attenuating distress-producing arousal by performing competing responses, or in curtailing attentional responses to the relevant discriminative stimuli,

the CS is likely to become endowed with relatively weak aversive properties.

As a partial check on the competing-response hypothesis the questionnaire data were scored for the number of subjects in each of the treatment conditions who reported deliberately engaging in various avoidant and stimulus neutralization stratagems. These types of responses occurred most frequently among subjects in the epinephrine .5 condition; not a single observer in the shock-threat group noted responding in this manner, while each of the remaining groups contributed a few subjects. The obtained group differences, although significant ($\chi^2 = 8.50$, $p < .05$), should be accepted with reservation considering the limited number of cases involved, and the fact that the expected frequencies in some of the cells were relatively small.

While the above supplementary findings have suggestive value, and are consistent with data from studies of direct instrumental learning demonstrating that high emotional arousal reduces cue utilization (Easterbrook, 1959; Kausler & Trapp, 1960), the degree to which response-competing processes can disrupt vicarious conditioning must be established empirically through systematic manipulation of appropriate mediating responses.

It should be noted in passing that, unlike direct classical conditioning in which the subject is unable to modify the intensity of aversive stimulation administered to him; in vicarious conditioning situations one can readily engage in response-interference stratagems designed to attenuate vicariously instigated affective reactions. For this reason, investigations of direct and vicarious classical conditioning may not always yield equivalent relationships between variables. Similarly, findings based on vicarious classical conditioning may not be applicable to modeling processes involving instrumental classes of responses. Thus, as demonstrated in Schachter's experiments, a person experiencing high-intensity autonomic responses may welcome the opportunity to engage in matching social behavior, whereas in a classical conditioning situation permitting no motoric responses high-aroused subjects can resort only to stimulus neutralization tactics as a means of reducing their discomfort.

The questionnaire data reveal additional complexities in the vicarious conditioning process that require systematic investigation. It was assumed that vicarious instigation of emotional responses is mediated by a process of stimulus generalization. That is, stimuli impinging upon a given person and the attendant reactions will arouse in the observer analogous emotional responses, the magnitude of the responses being a function of the degree of similarity between the participants. One would expect persons who possess similar characteristics to share many experiences in common. Results of experiments with infrahuman subjects furthermore reveal that the experience of repeated paired consequences is an important determinant of vicarious arousal. Church (1959), for example, found that rats subjected to paired aversive consequences subsequently exhibited greater emotional responsivity to the pain cues emitted by another rat than a group of animals that had received the same amount of aversive stimulation, but unassociated with the pain responses of another member of their species. Moreover, employing an interanimal avoidance conditioning procedure, Murphy, Miller, and Mirsky (1955) demonstrated that emotional responses in monkeys could be vicariously elicited not only by the sight of their experimental counterpart, but also through stimulus generalization by another monkey that was never involved in the original aversive contingencies.

In the present experiment, the self-report data indicated that with a few notable exceptions subjects did, in fact, experience strong empathetic emotional reactions. Several of the observers, however, derived considerable satisfaction from witnessing pain being inflicted on the model (e.g., "My main reaction was sadistic. My main thoughts were, 'Oh boy, is he getting it. . . .'" "I was rather embarrassed to see that I was grinning when my partner got shocked and dropped the stylus with a suppressed groan. . . ." "I, at times, sadistically wanted him to get shocked."). The total number of cases is too small for comparative analysis of vicariously conditioned responses. It is planned, however, to study the level of vicarious conditioning as a function of paired aversive consequences, paired opposing consequences, and unassoci-

ated negative outcomes experienced by the model and observing subjects.

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