FACTORS DETERMINING VICARIOUS EXTINCTION
OF AVOIDANCE BEHAVIOR THROUGH
SYMBOLIC MODELING

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The present study was primarily designed to test the hypothesis that magnitude of vicarious extinction is partly governed by the diversity of aversive modeling stimuli which are neutralized, and by observers' susceptibility to emotional arousal. A group of children, who were markedly fearful of dogs, observed a graduated series of films in which a model displayed progressively more intimate interactions with a single dog. A second group of children was exposed to a similar set of graded films depicting a variety of models interacting nonanxiously with numerous dogs varying in size and fearsomeness, while a control group was shown movies containing no animals. Both the single-modeling and multiple-modeling treatments effected significant reductions in children's avoidance behavior, but only the multiple-modeling treatment weakened their fears sufficiently to enable them to perform potentially threatening interactions with dogs. Emotional proneness and degree of vicarious extinction were found to be unrelated in the single-model condition and negatively correlated for children who received the more powerful multiple-modeling treatment.

It has been shown in a previous experiment (Bandura, Grusec, & Menlove, 1967) that avoidance behavior can be extinguished through observation of modeled approach responses without any adverse consequences accruing to the performing model. The basic mechanism underlying this phenomenon was assumed to involve vicarious extinction of mediating arousal reactions which motivate and exercise discriminative control over instrumental avoidance responsivity. The present study investigated variables that might be expected to facilitate vicarious extinction of conditioned emotionality by symbolic modeling procedures that lend themselves readily to psychotherapeutic applications.

The magnitude of vicarious extinction effects is likely to be determined, in part, by the number of modeling stimulus elements which are neutralized. That is, exposure to modeling displays depicting nonreinforced approach behavior by diverse models toward variant forms of the feared object should produce relatively thorough extinction of arousal reactions, and hence, extensive reduc-

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of films in which a fearless peer model exhibited progressively more intimate interactions with a dog. A second group of children was exposed to a similar sequence of graded modeling behavior, except that the films depicted a variety of models interacting positively with numerous dogs varying in size and fearlessness. Children assigned to a control group were shown movies that contained no canine characters.

Evidence that deviant behavior can be modified by a particular method is of limited therapeutic significance unless it can be demonstrated that established response patterns generalize to stimuli beyond those encountered in treatment, and that induced changes endure after the therapeutic conditions have been discontinued. Therefore children were readministered tests for avoidance behavior toward different dogs following completion of the treatment program and again a month later. As a further test of the therapeutic efficacy of symbolic modeling, control children were administered the multiple-modeling treatment following completion of the main experiment.

It was predicted that both modeling approaches would reduce children’s avoidance behavior, but that the diversified modeling procedure would achieve greater extinction effects. It was also hypothesized that low emotional proneness would favor relatively extensive vicarious extinction.

**METHOD**

**Subjects**

Thirty-two girls and 16 boys, varying in age from 3 to 5 years, participated in the experiment.

**Pretreatment Measurement of Avoidance Behavior**

All children enrolled in the Stanford Nursery School were administered a standardized test of avoidance behavior to identify those who were markedly fearful of dogs.

The test of strength of avoidance, which was identical to the one employed in an earlier experiment of vicarious extinction (Bandura et al., 1967), consisted of a graded series of 14 performance tasks in which the children were required to engage in increasingly intimate interactions with a dog. A female experimenter brought the children individually to the test room, where a brown cocker spaniel was confined in a playpen. In the initial set of tasks the children were asked, in the following order, to walk up to the playpen and look down at the dog, to touch it with the finger, and to pet it. Following the measurement of avoidance behavior to the dog in the protective enclosure, the children were requested to open a gate and remove the dog from the playpen, to walk the dog on a leash to a rug located at the end of the room, to remove the leash, and to turn the dog over and scratch her stomach. In subsequent items the children were asked to remain alone in the room with the animal and to feed her dog biscuits. The final and most difficult set of tasks required the children to climb into the playpen with the dog and, after having locked the gate, to pet her, scratch her stomach, and to remain alone in the room with the dog under the confining fear-arousing conditions.

The strength of the children’s avoidance tendencies was reflected not only in the approach responses that they were able to perform, but also in the extent to which they could engage in the required behavior and the degree of vacillation, reluctance, and fearfulness that preceded and accompanied each approach response. Therefore, as in the previous study, children were credited 2 points if they fully executed a given task either spontaneously or willingly, and 1 point when they performed it minimally with considerable hesitancy and reluctance. Thus, for example, children who promptly stroked the dog’s fur repeatedly when requested to do so received 2 points, whereas subjects who held back but then touched the dog’s fur briefly obtained 1 point. In the item requiring the children to remain alone in the room with the dog, they received 2 points if they approached the animal and played with her, and 1 point if they were willing to remain in the room but avoided any contact with the dog. Similarly, in the feeding task children were credited 2 points if they fed the dog by hand, but a single point if they tossed the biscuits on the floor and thereby avoided contact with the animal. The maximum approach score that a child could obtain was 28 points.

Children were grouped into two levels of avoidance behavior and assigned on a stratified random basis to one of three treatment conditions. Although identical test procedures were employed, the children selected for the present experiment displayed considerably more severe phobic behavior than subjects in the first study, with approximately 70% receiving scores of only 7 points or lower.

**Appraisal of Susceptibility to Emotional Arousal**

In order to establish whether emotional proneness of observers is a significant determinant of vicarious extinction, mothers rated their children’s fears on a questionnaire comprising 42 items, each represented by a five-interval scale describing increasing degrees of fearfulness. The items in this inventory were equally divided into the following three general
categories: animal fears, interpersonal fears (e.g., physical aggression, peer rejection, separation, authority figures), and fear of inanimate objects or events (e.g., darkness, thunder, heights, unfamiliar places). In addition, the mothers were interviewed regarding the extent of their children's anxiety responsiveness, specific traumatic episodes that might have contributed to fearfulness of dogs, parental and sibling modeling of dog avoidance and apprehension, and the methods that the parents had employed in attempts to modify their children's avoidance behavior. The mothers of 14 dauntless children who, in the preliminary behavioral assessment, eagerly performed all the tasks in the avoidance test were also administered both the fear inventory and the interview to provide a basis for evaluating antecedent factors and the scope and magnitude of anxiety reactions exhibited by dogphobic children.

**Treatment Conditions**

In all treatment conditions children were shown a total of eight different 3-minute movies, two per day on 4 alternate days. Each session was attended by a group of three or four children who were seated facing a large screen in a semidarkened room. At periodic intervals during the movies the experimenter made simple descriptive comments about the events depicted on the screen in order to sustain a high level of attending behavior in the children.

Subjects who participated in the single-model condition observed a fearless 3-year-old male model display progressively bolder approach responses toward the cocker spaniel. The fear-arousing properties of the modeled displays were gradually increased from session to session by varying simultaneously the physical restraints on the dog and the directness and intimacy of the modeled approach responses (see Figure 3).

In the initial interaction sequences, for example, the model's behavior was limited to looking at the dog in the playpen and occasional petting. Subsequent movies showed the venturesome model walking the dog on the leash, grooming her, holding her in his arms, and serving her canine gourmet snacks. The feeding routines began with relatively nonthreatening amusing scenes in which the dog drank milk from a baby bottle and manchured on a jumbo sucker held steadfastly by the model; later sequences depicted the dog vaulting toward hamburger patties and frankfurters that the model dangled in his hand. In the terminal set of movies the model climbed into the playpen with the dog where he petted her, fed her doggie bon bons and, as a finale, rested his head on his canine companion during a brief slesta in the overcrowded playpen. These modeled approach performances were interspersed with attention-sustaining segments in which the model attired both the dog and himself in colorful festive hats and oversized "Beatle" wigs.

Children assigned to the multiple-model condition observed, in addition to portions of each of the filmed sequences described above, several different girls and boys of varying ages interacting positively with sundry dogs ranging from diminutive breeds to larger specimens. The size and fearfulness of this canine aggregation were progressively increased from small dogs that were nonthreatening breeds to the more massive varieties. The films in the two modeling treatments were of equal length.

Children in the control condition were shown movies of Disneyland and Marineland for equivalent periods of time. This group provided a control for any direct extinction of avoidance behavior resulting from repeated behavioral assessments, as well as disinhibitory effects of extensive contact with amicable experimenters and increased familiarity with the person conducting the avoidance tests.

**Posttreatment Measurement of Avoidance Behavior**

On the day following completion of the treatment series, children were readministered the avoidance test consisting of the graded sequence of dog interaction tasks. In order to determine the generality of vicarious-extinction effects, half the children in each of the three conditions were tested initially with the experimental animal and then with an unfamiliar dog; the remaining children were presented with the two dogs in the reverse order. The testing sessions were separated by an interval of approximately 1 hour so as to minimize any transfer of emotional reactions provoked by one animal to the other.

The unfamiliar animal was a white mongrel, predominantly terrier, and of approximately the same size and activity level as the cocker spaniel. Both dogs elicited virtually identical approach responses from children tested in a separate study (Bandura et al., 1967) to evaluate the relative fearsomeness of the two animals.

**Follow-Up Appraisal**

A follow-up measurement of avoidance behavior was conducted approximately 1 month after the posttreatment assessment in order to determine the stability of modeling-induced changes. The children's responses were tested with the same performance tasks toward both animals, presented in the identical order.

After the experiment was completed, children who had participated in the modeling treatment were told that, while most dogs are friendly, before petting an unfamiliar dog they should ask the owner. This precautionary instruction was intended to forestall indiscriminate approach behavior toward strange dogs which might have unfriendly dispositions.

**Assessment Procedure**

The same female experimenter administered the pretreatment, posttreatment, and follow-up avoid-
ance tests. To obviate any possible bias, the experimenter was furnished only minimal information about the study and had no knowledge of the conditions to which the children were assigned. The treatment and assessment phases of the study were further separated by the use of different rooms for each activity.

In order to provide an estimate of interscorer reliability, 25% of the behavioral tests, randomly selected from pretreatment, posttreatment, and follow-up phases of the project, were scored simultaneously but independently by another rater who observed the test sessions through a one-way mirror from an adjoining observation room. The two raters were in perfect agreement on 95% of the specific approach responses that were scored.

During the administration of each test item, the animals’ activity was rated as either passive, moderately active, or vigorous, since the dogs’ behavior may have some influence on the degree of avoidance exhibited by the children. These data disclosed that the dogs did not differ in their behavior either across experimental phases or between treatment conditions.

**Treated Controls**

At the conclusion of the main experiment the efficacy of the symbolic modeling procedure was subjected to a further test based on an intrasubject design. Of the 16 children in the control group, 4 had left the San Francisco Bay area, but 12 were still enrolled in the nursery school. These children were shown the series of multiple-modeling films, after which they were administered the avoidance test with both animals.

**Results**

Because the distributions of scores departed substantially from normality, and markedly so in the control group, the significances of differences were evaluated by nonparametric techniques.

Mann-Whitney $U$ tests performed on approach scores for the total sample, and separately for each treatment condition at each phase of the experiment, disclosed no significant sex differences, and no effects due to the order in which the test animals were presented. Similarly, results of the Wilcoxon test reveal that children exhibited equivalent amounts of approach behavior toward the two dogs, indicating extensive generalization of vicarious extinction effects. The data were therefore pooled with respect to test order, dogs, and sex for evaluating the relative efficacy of the symbolic modeling treatments.

[Image of a graph showing median approach scores obtained by children in each of three conditions at different phases of the experiment.]

**Fig. 1.** Median approach scores obtained by children in each of three conditions at different phases of the experiment.

**Within-Group Changes in Approach Behavior**

The approach scores obtained by children in each of the three conditions at different phases of the experiment are shown graphically in Figure 1. A Friedman two-way analysis of variance disclosed a highly significant phases effect ($\chi^2 = 15.79; \ p < .001$). Separate comparisons of these scores for each condition by the Wilcoxon test indicate that the sizable phases effect is entirely due to the behavioral modifications produced by symbolic modeling. Control children showed no changes in their dog approach behavior during either posttreatment or follow-up assessments relative to their pretherapy behavior. By contrast, children in the single-modeling condition displayed significant increases in approach behavior after the completion of treatment ($T = 22; \ p < .01$), and 1 month later ($T = 9; \ p < .005$). Subjects who had observed the multiple modeling likewise achieved substantial gains as measured in posttreatment ($T = 13; \ p < .005$) and follow-up ($T = 6.5; \ p < .005$) phases of the project.

It is interesting to note that, whereas children in the single-modeling condition main-
tained their gains at the level achieved after treatment, those who had the benefit of multiple modeling became even bolder toward dogs in the follow-up period compared to their posttreatment behavior ($T = 10; p < .02$, two-tailed test).

**Differences Between Conditions**

The obtained differences between treatment conditions were not of statistically significant magnitude in the posttherapy assessment, although multiple-modeling subjects differed from the controls just short of the .05 significance level ($U = 87.5$).

A Kruskal-Wallis one-way analysis of variance computed on change scores between pretherapy and follow-up performances yielded a significant treatment effect ($H = 5.01; p < .05$). Comparisons between pairs of conditions, evaluated by the Mann-Whitney $U$ test, showed that children who received the single-modeling ($U = 80.5; p < .05$) and the multiple-modeling ($U = 76; .025 < p < .05$) treatments achieved greater increases in approach behavior than did the controls. The two modeling conditions, however, did not differ from each other with respect to total approach scores.

**Treated Controls**

The approach scores obtained by control children in three pretherapy assessments and after they had participated in the multiple-modeling treatment are shown in Figure 2.

A Friedman two-way analysis of variance performed on these scores yielded a highly significant treatment effect ($\chi^2 = 13.42; p < .01$). Wilcoxon tests computed between scores at different phases of the study revealed that the children’s avoidance behavior remained unchanged throughout the control period. However, after exposure to multiple modeling of fearless behavior toward dogs, control children displayed a sharp increase in approach responses compared to their performance in the initial appraisal ($T = 3; p < .005$), the posttest ($T = 3; p < .005$), and the follow-up ($T = 0; p < .005$) assessments. The increased boldness of one of the control children who had been subsequently treated is portrayed in Figure 3. The top frames show the model’s dauntless behavior; the lower frames depict the girl’s fearless interaction with the animals, both of which she boldly corralled into the playpen after the formal test.

**Terminal Performances**

The percentage of children in each condition who were able to perform the terminal approach task (i.e., remain confined with the dog in the playpen) is shown in Figure 4. Although the groups did not differ in this regard immediately after treatment, in the subsequent follow-up assessment twice as many children in the multiple-model condition completed the terminal task as did subjects in the other two groups ($\chi^2 = 2.73; p < .05$), which did not differ from each other.

The efficacy of the multiple-modeling treatment is further reflected in the substantial increase in terminal performances by treated controls from 17% in the follow-up phase to 50% after exposure to diversified symbolic modeling (Figure 4). Comparison of the incidence of terminal performances by children presented with the single-modeling display and all subjects who witnessed the
Fig. 3. Photographs of a child who was apprehensive about dogs engaging in fearless interactions with dogs after exposure to the series of therapeutic films.
Multiple modeling shows the latter form of treatment to be superior ($\chi^2 = 2.98; p < .05$) for completely eliminating dog avoidance behavior.

### TABLE 1

**DEGREE OF RELATIONSHIP BETWEEN DIFFERENT INDEXES OF EMOTIONAL PRONENESS AND VICARIOUS EXTINCTION**

<table>
<thead>
<tr>
<th>Emotionality variables</th>
<th>Post-treatment change</th>
<th>Follow-up change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-modeling condition</td>
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<td></td>
</tr>
<tr>
<td>Total fears (inventory)</td>
<td>.09</td>
<td>.04</td>
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<tr>
<td>Animal</td>
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<td>.06</td>
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<tr>
<td>Interpersonal</td>
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<td>Inanimate objects</td>
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<td>-.01</td>
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<tr>
<td>Total fears (interview)</td>
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<td>.41</td>
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<tr>
<td>Pretreatment avoidance behavior</td>
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<td>.18</td>
</tr>
<tr>
<td>Multiple-modeling condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total fears (inventory)</td>
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<td>-.41**</td>
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<tr>
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<tr>
<td>Interpersonal</td>
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<tr>
<td>Inanimate objects</td>
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<td>-.48**</td>
</tr>
<tr>
<td>Pretreatment avoidance behavior</td>
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<td>.36</td>
</tr>
</tbody>
</table>

* $.05 < p < .10.$  
** $p < .05.$  
*** $p < .01.$

**Vicarious Extinction as a Function of Emotional Proneness**

The rank-correlation coefficients between the various measures of avoidance behavior and emotional proneness are given in Table 1. Severity of the children's avoidance behavior was unrelated to the degree to which they benefited from the modeling treatments; nor were the indexes of emotional proneness significant predictors of vicarious extinction for children who received the single-modeling treatment. On the other hand, in the multiple-modeling condition, which produced the more thorough extinction effects, susceptibility to emotional arousal was inversely related to degree of behavioral improvement. It is interesting to note, however, that emotional responsivity to potentially threatening interpersonal and inanimate events, rather than severity of animal fears, proved to be the better predictive measures.

**Antecedents of Dog-Avoidance Behavior**

According to the questionnaire data the dog-phobic children have approximately twice as many animal fears ($t = 2.63$), which tend to be of greater intensity ($t = 1.99$), than children who displayed completely fearless behavior toward the test dog during the initial assessment. These two groups of children did not differ, however, with respect to their anxiety reactions to interpersonal and inanimate threats.

There is some evidence to suggest that parental modeling of fearful behavior is a significant contributory factor to children's fearfulness. Only one parent in the bold group reported any trepidation about dogs, whereas in 17 of the families of avoidant children one or both parents displayed such fears ($\chi^2 = 2.94; p < .05$). The data yielded no differences concerning peer modeling of dog-avoidance behavior and, although the incidence of specific traumatic episodes involving dogs was somewhat higher for fearful (35%) than bold children (21%), the groups did not differ significantly in this regard.

Perhaps the most interest finding in the interview data is that the majority of parents (56%) made no attempts to overcome their children's fears. Those who periodically tried
remedial measures favored either explanations and verbal reassurances (12%), enforced contact with dogs (19%), or modeling of fearlessness (14%). However, the extinction and modeling endeavors rarely involved carefully graded presentations of threatening stimuli without which these techniques are not only likely to be ineffective, but may actually exacerbate anxiety reactions. A not uncommon domestic modeling scene is one in which a parent is busily petting a dog that is jumping about while simultaneously pressuring the child, who is clinging fearfully, to touch the bounding animal. By contrast, the present experiment, in addition to utilizing the principle of gradualism to reduce possible arousal of anxiety, involved concentrated exposures to modeling displays under protected observation conditions, and extensive variation of model characteristics, intimacy of approach behavior, and aversive properties of the feared object. Had the modeling sequences been presented in a widely dispersed and haphazard fashion and restricted to the more reserved petting responses by adults (whom the children are likely to discriminate as better able to protect themselves), the vicarious extinction outcomes might have been relatively weak and unpredictable.

DISCUSSION

The therapeutic effects of symbolic modeling appear sufficiently promising to warrant further development of this treatment approach. Highly fearful children who observed approach behavior modeled without any adverse consequences to the performer subsequently displayed stable reductions in avoidance behavior. Moreover, the extinction effects transferred beyond the stimulus objects encountered in treatment.

The vicarious extinction outcomes produced by the single symbolic model in this study appear to be somewhat weaker than earlier results with a subgroup of equally avoidant children who viewed live demonstrations of essentially the same approach responses by the same model. Although the single-modeling treatment effected reductions in children’s avoidance responses, it did not sufficiently weaken their fears to enable them to carry out the threatening terminal approach behavior. There is evidence, however, that the diminished efficacy of symbolic modeling cues can be offset by a broader sampling of models and aversive stimulus objects. Children who received the diverse modeling treatment not only showed continued improvement in approach behavior, but also achieved terminal performances at rates comparable to equally avoidant children who, in the previous experiment, observed fearless behavior performed by a single real-life model.

The finding that high emotional proneness attenuates vicarious extinction indicates that modeling procedures must be further modified or supplemented with additional techniques to effect substantial reduction of avoidance tendencies in subjects who display a generalized pattern of anxiety. Such persons are unlikely to experience marked decrements in emotional responsiveness on the basis of a single exposure to a graded series of modeling situations. In a current adaptation of symbolic modeling for the treatment of phobias in adults, three factors have, therefore, been incorporated to further increase the therapeutic power of this method. First, clients are taught to induce and maintain anxiety-inhibiting relaxation throughout the period of exposure. Second, the rate of presentation of modeling stimuli is controlled by the client. Thus, if a particular modeling situation proves to be emotion-provoking the client reviews the threatening scene repeatedly until it is completely neutralized before proceeding to the next item in the graduated sequence. A self-regulated modeling treatment should permit greater control over extinction outcomes. Finally, clients who fail to attain terminal behavior are administered a powerful live-modeling-guided-participation form of treatment in which, after observing the most fear-provoking behavior repeatedly modeled without any adverse consequences, clients are aided through demonstration to perform progressively more threatening responses toward actual feared objects.

The phenomenon of vicarious extinction not only has important clinical implications, but it also raises interesting theoretical questions concerning possible mediational mecha-
nisms governing the process of extinction itself. It is evident from results of both the present and the earlier study that performance of an overt response is not essential for its extinction. These findings question the generality of theoretical conceptualizations of extinction that rely heavily upon cognitive or physiological effects assumed to result from repeated evocation of effortful responses without reinforcement.

Both nonresponse extinction paradigms and explanations of vicarious effects (Bandura, 1965) are compatible with the dual-process theory of avoidance behavior. According to this view stimuli acquire, through their temporal conjunction with aversive experiences, the capacity to produce arousal reactions which have both central and autonomic components. It is further assumed that instrumental avoidance responses become partly conditioned to arousal-correlated stimuli. Suggestive evidence that arousal mediators may exercise discriminative control over avoidance behavior is provided by Solomon and Turner (1962). Animals first learned to make an avoidance response to a light stimulus. They were then skeletally immobilized by curare, and shock was paired with one tone while a contrasting tone was never associated with aversive stimulation. In subsequent tests the animals displayed the same degree of avoidance in response to the negatively valenced tone and the light, both of which evoked common arousal reactions, whereas avoidance responses rarely occurred to the neutral tone. Rescorla and Solomon (1967) provide additional evidence that classically conditioned effects exert mediating control over instrumentally learned behavior. The transfer is primarily achieved through central mechanisms rather than at the autonomic system level as is commonly assumed.

If conditioned arousal reactions are extinguished, both the motivation and internal controlling stimuli for avoidance responses are thus removed. It has been shown in a previous experiment (Bandura & Rosenthal, 1966) that conditioned emotional reactivity can be extinguished on a vicarious basis by having observers witness a model encounter aversive stimuli without experiencing any adverse consequences. A systematic test of this mediational theory of vicarious extinction would require simultaneous recording of autonomic and evoked electroencephalographic correlates of observational inputs involving modeled approach behavior toward feared objects.

Results of studies designed to extinguish naturally created avoidance behavior have bearing on another important issue in learning theory. Recent investigations of symbolic control of classical conditioning phenomena (Chatterjee & Erikson, 1962; Fuhrer & Baer, 1965; Grings, 1965) demonstrate that only subjects who recognize the contingency between conditioned and unconditioned stimuli display autonomic conditioning. Moreover, subjects who are informed that the conditioned stimulus will no longer be accompanied by aversive stimulation show a prompt and virtually complete loss of emotional responses without experiencing any nonreinforced presentations of the conditioned stimulus.

The above findings provide strong support for the view that emotional conditioning and extinction, rather than representing a simple process in which external stimuli are directly and automatically connected to overt responses, are mediated through symbolic activities. However, precipitous extinction of laboratory-induced fears through informational means contrasts sharply with evidence of weak cognitive control of fears established under naturalistic conditions. Dog-avoidance responses were unaffected by informing children prior to the behavioral tests that the dogs were friendly and harmless. In fact, an initial procedure in which dog scenes were interspersed in absorbing cartoons had to be abandoned because the pictorial animals, although incapable of biting or otherwise hurting observers, nevertheless evoked strong aversive reactions so that many children promptly turned away from the screen whenever the canine characters appeared. Severe snake phobics likewise experience considerable emotional disturbance at the sight of a picture of a reptile while acknowledging that the agitation is groundless, since pictorial snakes cannot possibly inflict any injury. In the latter cases conditioned emotional responses are almost completely dissociated
from accompanying cognitions. It would appear that principles regarding avoidance behavior established solely on the basis of responses created under laboratory conditions may, in some cases, have limited applicability to naturalistic phenomena the investigations are intended to elucidate.

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