

VICARIOUS PROCESSES: A CASE OF NO-TRIAL LEARNING¹

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Research and theoretical interpretations of learning processes have focused almost exclusively on a single mode of response acquisition which is exemplified by the operant or instrumental conditioning paradigm. In this procedure the organism is impelled, in one way or another, to perform responses under specific stimulus conditions and, through differential reinforcement of spontaneously emitted variations in behavior, new response patterns are developed or existing repertoires are brought under new discriminative stimulus control. It is generally assumed that the principles

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governing the latter mode of response acquisition account also for social learning phenomena occurring under naturalistic conditions.

The continued adherence to a relatively narrow range of learning principles and procedures stems primarily from the fact that certain critical conditions that obtain in real-life situations are rarely, if ever, reproduced in laboratory studies of learning. Thus, in laboratory investigations experimenters arrange comparatively benign environments in which errors will not produce fatal consequences for the organism. By contrast, naturalistic environs are loaded with potentially lethal consequences that unmercifully befall those who happen to perform hazardous errors. For this reason, it would be exceedingly injudicious to rely primarily upon trial-and-error and successive approximations methods in teaching children to swim, adolescents to drive automobiles, or adults to master complex occupational and social tasks. If rodents and pigeons toiling in Skinner boxes and various mazes could likewise get electrocuted, dismembered, or extensively bruised for errors that inevitably occur during early phases of learning, it is a reasonably safe prediction that few of these venturesome subjects would ever survive the shaping process. Apart from the questions of efficiency (Bandura and McDonald, 1963) and survival, it is doubtful if many classes of responses would ever be acquired if social training proceeded solely by the method of approximations through differential reinforcement of emitted responses (Bandura, 1962).

It is evident from informal observation that vicarious-learning experiences and response-guidance procedures involving both symbolic and live models are utilized extensively in social learning to short-circuit the acquisition process, and to prevent one-trial extinction of the organism in potentially hazardous situations. Although historically, learning by vicarious experience has been generally labeled "imitation," in the contemporary literature essentially the same phenomena are subsumed under other terms such as "observational learning," "copying," "social facilitation," "vicarious learning," "contagion," "identification," and "role-playing." The diversity in constructs reflects the arbitrary distinctions between vicarious learning events that have been proposed, at one time or another, based on the types of response classes modified (Lazowick, 1955; Osgood *et al.*, 1957), the antecedent variables supposedly governing the occurrence of matching responses (Parsons and Shils, 1951), the fidelity with which modeling stimuli are reproduced (N. E. Miller and Dollard, 1941; Riopelle, 1960), the specificity and generality of observational learning (Parsons and Shils, 1951), and in terms of whether matching responses are performed in the presence or absence of the model (Mowrer, 1950). While it is possible to draw distinctions between descriptive terms based on certain stimulus, mediating, or terminal-response variables, one might

question whether it is advantageous to do so, since essentially the same learning process is involved regardless of the content and generality of what is learned, the models from whom the response patterns are acquired, and the stimulus situations in which the relevant behavior is subsequently performed. Therefore, the terms imitative, observational, and vicarious learning will be employed interchangeably to refer to behavioral modifications resulting from exposure to modeling stimuli.

For the purposes of the present discussion, a vicarious learning event is defined as one in which new responses are acquired or the characteristics of existing response repertoires are modified as a function of observing the behavior of others and its reinforcing consequences, without the modeled responses being overtly performed by the viewer during the exposure period. In demonstrating vicarious learning phenomena, it is therefore necessary to employ a nonresponse acquisition procedure in which a subject simply observes a model's behavior, but otherwise performs no overt instrumental responses, nor is administered any reinforcing stimuli during the period of acquisition. Any learning that occurs under these limiting conditions is purely on an observational or covert basis. This mode of response acquisition is accordingly designated as no-trial learning, since the observer does not engage in any *overt responding trials* although, as will be shown later, he may require multiple *observational trials* in order to reproduce the modeled stimuli accurately. Moreover, the development of mediational responses, in the form of imaginal and implicit verbal representations of the perceived stimulus events, may play a critical role in the vicarious learning process.

I. Theories of Response Acquisition through Observation

The concept of imitation in psychological theory has an extended history dating back to Morgan (1896), Tarde (1903), and MacDougall (1908), who regarded imitativeness as an innate propensity. These early instinctive interpretations of the imitative process not only impeded empirical investigations of probable controlling variables, but due to the vehement reaction against the instinct doctrine, even the phenomena subsumed under the concept were, until recent years, either widely ignored or repudiated.

A. ASSOCIATIVE AND CLASSICAL CONDITIONING THEORIES

As the instinct doctrine fell into disrepute, a number of psychologists, notably Humphrey (1921), Allport (1924), and Holt (1931), attempted to account for imitative behavior in terms of associative or Pavlovian conditioning principles. According to Holt's conceptualization, for example,

when an adult copies a response made by a child, the latter tends to repeat the same behavior, and, as this circular associative sequence continues, the adult's matching behavior becomes an increasingly effective stimulus for the child's response. If, during this spontaneous mutual imitation, the adult performs a response that is novel for the child, the latter will copy it. Piaget (1951) is a more recent exponent of essentially the same point of view, according to which the imitator's response serves initially as the stimulus for the model in alternating imitative sequences. Allport similarly presented imitative responses as instances of classical conditioning of verbalizations, motoric responses, or emotions to matching social stimuli with which they have been contiguously associated.

Although the associative theories account adequately for the imitator's repetition of his own behavior, they fail to explain the psychological mechanisms governing the emergence of *novel* responses during the model-observer interaction sequence. Moreover demonstrations of observational learning in animals and humans do not ordinarily commence with a model's matching a semi-irrelevant response of the learner. Thus, in utilizing modeling procedures to teach a mynah bird to talk, the trainer does not engage initially in circular crowing behavior; instead, he begins by emitting verbal responses that he wishes to transmit, but which clearly do not exist in integrated form in the bird's vocal repertoire.

B. INSTRUMENTAL CONDITIONING THEORIES

As theoretical explanations of learning shifted the emphasis from classical conditioning to instrumental learning based on rewarding and punishing response consequences, theories of imitation similarly assumed that the occurrence of observational learning is contingent upon the administration of reinforcing stimuli either to the model or to the observer. This point of view was most clearly expounded by Miller and Dollard (1941) in the classic publication, *Social Learning and Imitation*. According to this theory, the necessary conditions for learning through imitation include a motivated subject who is positively reinforced for matching the correct responses of a model during a series of initially random, trial-and-error responses.

The experiments conducted by Miller and Dollard involved a series of two-choice discrimination problems, in each of which a trained leader responded to environmental stimuli that were concealed from the subject; consequently, he was totally dependent upon the cues provided by the leader's behavior. The model's choices were consistently rewarded and the observing subject was similarly reinforced whenever he matched the choice responses of the imitator. This form of imitation was labeled by the authors "matched-dependent behavior" because the subjects relied on the

leader for relevant cues and matched his responses. Based on this paradigm, it was shown that both rats and children readily learn to follow their respective models, and generalize imitative responses to new stimulus situations, new models, and different motivational states.

While these experiments have been widely accepted as demonstrations of learning by imitation, they in fact represent only the special case of discrimination place-learning, in which the behavior of others provides discriminative stimuli for responses that already exist in the subject's behavior repertoire. Indeed, had the relevant environmental cues been made more distinctive, the behavior of the models would have been quite irrelevant and perhaps even a hindrance in the acquisition process. By contrast, most forms of imitation involve *response* rather than *place* learning, in which subjects combine behavioral elements into relatively complex novel responses solely by observing the performance of social models, without any opportunity to perform the model's behavior in the exposure setting and without any reinforcers administered either to the models or to the observers (Bandura, 1965a). In the latter instance, modeling cues constitute an indispensable aspect of the learning process. Moreover, since the S-R reinforcement paradigm for observational learning requires the subject to perform the imitative response before he can learn it, the theory propounded by Miller and Dollard evidentially accounts more adequately for the emission of previously learned matching responses than for their acquisition. Continuing with our example of language learning, in order for our mynah bird to learn the words *social psychology* imitatively it would first have to emit the words *social psychology* in the course of random vocalization, match them accidentally with the trainer's verbal responses, and secure a positive reinforcement. It is evident from the foregoing discussion that the conditions assumed by Miller and Dollard to be necessary for learning by imitation place severe limitations on the types of behavioral changes that can be attributed to the influence of social models.

The operant-reinforcement analysis of imitative behavior (Baer and Sherman, 1964; Skinner, 1953, 1957) is in many respects similar to one originally advanced by Miller and Dollard. According to the former interpretation, if matching responses are positively reinforced and divergent responses are either nonrewarded or punished, the model's behavior comes to serve as discriminative stimuli for reinforcement. Given an adequate reinforcement history for behavioral reproduction of modeling stimuli, matching responses per se may gradually acquire secondary reinforcing properties. After a generalized imitative repertoire has been developed on the basis of consistent rewarding consequences in a variety of situations, the individual will tend to display a high incidence of precisely

imitative behavior which, due to its acquired reward value, may be maintained at least temporarily in the absence of externally administered reinforcers.

Reinforcement control of generalized imitation is well illustrated in a recent study conducted by Baer and Sherman (1964). Three imitative responses (head nodding, mouthing, and novel verbalizations) were strongly established in young children by social reinforcement from a puppet who had instructed the subjects to match his modeling behavior. After a stable rate of imitative responding had been achieved, the puppet displayed nonreinforced bar-pressing interspersed among the other three matching responses, which were maintained in the children on a continuous schedule of reinforcement. Under these conditions, the subjects showed an increase in imitative bar-pressing behavior over their operant levels. In order to further demonstrate the dependence of generalized imitative bar-pressing on direct reinforcement of other matching responses either social reinforcers were no longer presented following imitative head nodding, mouthing, and verbalization, or the puppet ceased to exhibit these responses. Both the extinction and the time-out from modeling procedures resulted in decreased imitative bar-pressing. Moreover, reinstatement of the other three modeling cues and reinforcement of the corresponding matching responses produced increased imitative bar-pressing behavior.

It should be noted that, like the Miller and Dollard theory, the operant-reinforcement interpretation of modeling processes accounts satisfactorily for the discriminative and reinforcing stimulus control of previously learned matching responses, but it throws no light on the variables governing the acquisition of novel responses through observation. Such responses are learned during the period of exposure to modeling stimuli prior to the operation of the reinforcement practices. Indeed, had the children in the experiment cited above been tested for imitative learning immediately following demonstration of the four critical responses, it is a safe prediction that they could have reproduced the modeled repertoire without undergoing any imitation contingent reinforcement. In evaluating the role of reinforcement in modeling processes, it is therefore important to distinguish *acquisition* from *performance*.

Numerous investigations, differing considerably in the choice of reinforcing stimuli, types of matching responses, and age status of the subjects, have shown that the presentation of imitation-contingent positive or negative reinforcers either to the model (Bandura, 1965; Bandura *et al.*, 1963c; Kanfer, 1965; Walters *et al.*, 1963; Walters and Parke, 1964) or to the subject (Kanareff and Lanzetta, 1960a,b; Lanzetta and Kanareff, 1959; Metz, 1964; Schein, 1954) have a facilitative or a suppressive

effect on the subject's subsequent performance of matching responses. However, results from a recent experiment (Bandura, 1965b) lend support to the theory that the *acquisition* of matching responses results primarily from stimulus contiguity and associated symbolic processes, whereas reinforcing consequences to the model or to the observer have a major influence on the *performance* of imitatively learned responses.

In the above study, children observed a film-mediated model who exhibited a sequence of novel physical and verbal aggressive responses. In one treatment condition the model was severely punished following the

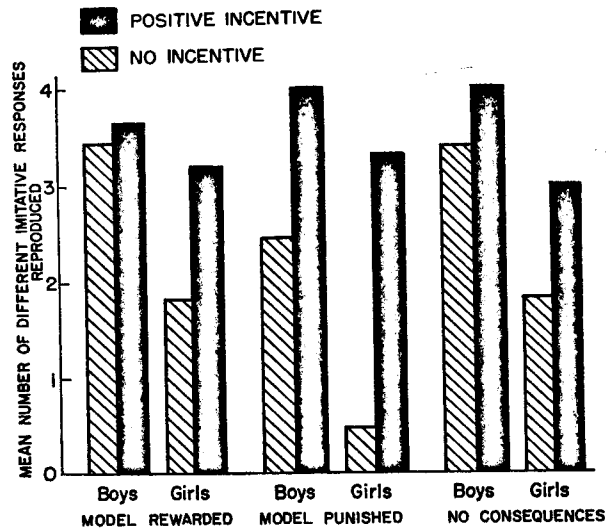


FIG. 1. Mean number of different matching responses reproduced by subjects as a function of incentive conditions and the model's reinforcement contingencies. (Adapted from Bandura, 1965b.)

display of aggressive behavior; in the second, the model was generously rewarded with delectable treats and lavish praise; the third condition presented no response consequences to the model. A postexposure performance test of imitation revealed that the reinforcement contingencies applied to the model's responses resulted in differential degrees of matching behavior. Relative to subjects in the model-punished condition, children in the model-rewarded and the no-consequence groups spontaneously performed a significantly greater variety of imitative responses. Moreover, boys reproduced substantially more of the model's behavioral repertoire than girls, the differences being particularly marked in the model-punished treatment (Fig. 1).

Following the performance test, children in all three groups were offered highly attractive incentives contingent upon their reproducing the model's responses, so as to activate into performance what the children had acquired through observation. Although learning must necessarily be inferred from performance, it was assumed that the responses reproduced under positive incentive conditions would provide a relatively accurate index of acquisition.

As shown in Fig. 1, the introduction of positive incentives completely wiped out the previously observed performance differences, revealing an equivalent amount of learning among children in the model-rewarded, model-punished, and the no-consequences conditions. Similarly, the initially large sex difference was substantially reduced.

While there is ample evidence that reinforcing stimuli can significantly alter the probability of future occurrence of preceding matching responses, consequent events can hardly serve as a necessary precondition for their acquisition. However, under conditions where reinforcers are repeatedly administered to a model as he displays an ongoing series of responses, observation of reinforcing consequences occurring early in the sequence might be expected to increase the vigilance of the observer toward subsequently modeled behavior. The anticipation of positive reinforcement for reproducing matching responses by the observer may therefore, indirectly influence the course of vicarious learning by enhancing and focusing the subject's observing responses.

C. SENSORY FEEDBACK THEORY

Mowrer's proprioceptive feedback theory of imitation (1960) similarly highlights the role of reinforcement but, unlike the preceding approaches which reduce imitation to a special case of instrumental learning, Mowrer emphasizes the classical conditioning of positive and negative emotions to matching response-correlated stimuli. Mowrer distinguishes two forms of imitative learning in terms of whether the observer is reinforced directly or vicariously. In the former case, the model performs a response and at the same time rewards the observer. Through the repeated contiguous association of the model's behavior with rewarding experiences, these responses gradually take on positive value for the observer. On the basis of stimulus generalization, the observer can later produce self-rewarding feedback experiences, simply by reproducing as closely as possible the model's positively valenced behavior.

In the second or "empathetic" form of imitative learning, the model not only exhibits the responses but also experiences the reinforcing consequences. It is assumed that the observer, in turn, experiences empathetically the sensory concomitants of the model's behavior, and also intuits his

satisfactions or discomforts. As a result of this higher-order vicarious conditioning, the observer will be predisposed to reproduce the matching responses for the attendant positive sensory feedback.

There is considerable research evidence that imitative behavior is enhanced by increasing the rewarding qualities of a model (Bandura and Huston, 1961; Grusec, 1965; Grusec and Mischel, 1965; Hanlon, 1964; Henker, 1964; Mussen and Parker, 1965), and by positive reinforcers administered to a model (Bandura, 1965b; Bandura *et al.*, 1963c; Walters *et al.*, 1963). Although the sensory feedback conception of imitation does not require a response to be performed before it can be learned, it nevertheless fails to explain the acquisition of matching responses when reinforcers are not dispensed either to the model or to observers.

There is some reason to believe that the acquisition, integration, facilitation, and inhibition of responses are in large part centrally, rather than peripherally, mediated. For example, preliminary findings from curare-conditioning experiments—in which animals are skeletally immobilized during aversive conditioning or extinction—demonstrate that conditioned emotional responses can be readily acquired and extinguished independently of skeletal responding and its correlated proprioceptive feedback (Black, 1958; Black *et al.*, 1962). Moreover discriminative classical conditioning, established under curare, can subsequently control discriminative instrumental avoidance responses in the normal state (Leaf, 1964; Solomon and Turner, 1962). Although the mediators of this discriminative transfer have not been identified, the data bring into question theories of learning that rely heavily upon differential proprioceptive cues as explanatory factors.

A peripheral feedback theory would also require highly differential proprioceptive cues to be associated with practically identical overt response patterns. It is more likely that proprioceptive stimulation arising from hitting responses directed toward parents and toward peers may differ little, if at all; nevertheless, physically aggressive responses toward parents are generally strongly inhibited, whereas physical aggression toward peers is much more readily expressed (Bandura, 1960; Bandura and Walters, 1959). One could therefore predict more accurately the expression or inhibition of aggression from knowledge of the stimulus context (e.g., church, athletic gymnasium), the object (e.g., parent, priest, policeman, or peer), and other cues that signify predictable reinforcement contingencies, than from any direct assessment of the type of sensory feedback correlated with the agent's aggressive responses. Thus, in most social interaction sequences, proprioceptive cues constitute only a small portion of the total stimulus complexes. It is therefore necessary to take account also of external stimulus elements and their cognitive correlates,

which probably serve as important discriminative stimuli in the regulation of both matching and nonimitative behavior.

It is also evident that rapid selection of responses from among a varied array of alternatives cannot be governed by proprioceptive feedback since relatively few responses could be activated, even incipiently, during characteristically brief pre-decision periods (N. E. Miller, 1964). In recognizing this problem, Mowrer (1960) has conjectured that the initial scanning and selection of responses may occur primarily at the symbolic rather than at the action level.

In this same connection, behavior is influenced by models even when the responses in question do not generate cues possessing motivational properties. This is best exemplified by studies of observational learning of perceptual-motor tasks from filmed demonstration (Sheffield and Maccoby, 1961) that do not contain positive or aversive stimuli essential for the classical conditioning of emotional responses. Mowrer has, of course, pointed out that sensory experiences not only classically condition positive or negative emotions, but also produce conditioned sensation or images. In most cases of observational learning, such perceptual or imaginal responses may be the only important mediating processes. Mowrer's sensory-feedback theory of imitation may therefore be primarily relevant to instances in which the modeled responses incur relatively potent reinforcing consequences capable of endowing response-correlated stimuli with motivational properties.

D. STIMULUS CONTIGUITY AND MEDIATIONAL THEORIES

Recent theoretical analyses of observational learning (Bandura, 1962; Sheffield, 1961) place primary emphasis on the role of stimulus contiguity and associated cognitive response-stimulus events in the acquisition process. According to contiguity theory, during the period of exposure modeling stimuli elicit in observing subjects configurations and sequences of sensory experiences which, on the basis of past associations, become centrally integrated and structured into perceptual responses.

There is some research evidence in the sensory conditioning literature (Conant, 1964; Leuba, 1940; Naruse and Abonai, 1953) that, as a function of contiguous stimulation, an antecedent stimulus can acquire the capacity to elicit imaginal representations of associated stimulus events even though they are no longer physically present. These findings indicate that imaginal responses are conditionable, and presumably extinguishable, as are overt classes of behavior. It is therefore reasonable to suppose that, in the course of observation, transitory sensory and perceptual phenomena are converted to retrievable images of the modeled sequences of behavior. Indeed, a reader could readily elicit, through verbal self-

instruction, vivid imagery of the stylistic social responses, physical attributes, role behaviors, and skilled performances of close acquaintances, instructors, entertainers, and a host of other models either encountered in actual social situations or provided in audiovisual displays.

In addition to the acquisition of imaginal responses, once verbal labels have become attached to objective stimuli, the observer acquires, during the period of exposure, verbal equivalents of the model's behavior. Recent modeling experiments (Bandura, 1965b; Bandura *et al.*, 1963c), for example, revealed that children who had observed a model exhibit novel patterns of aggressive responses subsequently described the entire sequence of aggressive acts with considerable accuracy. The above findings thus provide some basis for assuming that symbolic or representational responses in the form of images and verbal associates of the model's behavior constitute the important residues of observational experiences.

The discussion has so far been concerned with the process whereby different forms of representational responses are acquired on the basis of observation. A mediational theory must also account for the nature of the linkage between cognitive representation, on the one hand, and behavioral reproduction, on the other. There is ample evidence (Dollard and Miller, 1950; Mowrer, 1960; Staats and Staats, 1963) that implicit responses provide cues which can serve as discriminative stimuli for directing and controlling instrumental responses in the same way as environmental events. It is likewise assumed that symbolic matching responses possess cue-producing properties that are capable of eliciting, some time after observation, overt responses corresponding to those that were modeled. However, it should be noted here that although the stimuli generated by symbolic behavior can become discriminative for overt action, it does not mean that the observer will necessarily be able to execute skillfully the matching patterns of behavior. This issue will be discussed later.

In order to test the proposition, advanced in the above theory, that symbolization facilitates vicarious learning, a modeling study was conducted (Bandura *et al.*, 1965a) in which symbolic responses were directly manipulated. During the response-acquisition phase of the experiment, children observed a film-mediated adult model exhibit an extended sequence of relatively novel responses, projected on a lenscreen in a television console. The following three conditions of observation were employed. In the *facilitative symbolization* condition, subjects verbalized the modeling stimuli as they were presented on the lenscreen. The purpose of the concurrent verbalization was to enhance the development of imaginal and verbal associates for the model's behavior. Children in the *passive observation* group were instructed simply to observe the film care-

fully. A third experimental treatment was designed to counteract the establishment of representational responses by having subjects produce interfering verbal responses throughout the period of exposure. In the latter *competing symbolization* condition, subjects were instructed to count rapidly while attending closely to the film.

The degree of observational learning may also be partly governed by incentive-related sets which exert selective control over the type, intensity, and frequency of observing responses. It is likewise entirely possible that different symbolization instructions could create in observers differential anticipations as to whether or not they might later be called upon to demonstrate what they had learned from the filmed presentation. Such self-induced sets, if operative, might affect attentive behavior and thus confound the effects of symbolization processes. Hence, in the present study half of the subjects in each of the three observational treatments were assigned to a positive incentive-set condition. These children were informed that following the movie, they would be asked to reproduce the model's responses and given candy treats for each behavioral element performed correctly. The remaining subjects, assigned to the no-incentive nonperformance condition, were told that immediately after viewing the film they would return to their classroom, thus providing them with little or no incentive to learn the model's repertoire.

An incentive set may influence the amount of behavioral reproduction by either (1) augmenting and channeling the observing responses during acquisition, or (2) actuating deliberate, implicit rehearsal of matching responses immediately after exposure. Since the present experiment was primarily concerned with issues of response acquisition, and the occurrence of differential anticipatory rehearsal would obscure results, children in all groups were assigned the task of counting out loud during the brief period intervening between the end of the movie and reproduction. By this procedure, interpolated activities were held constant for all groups and facilitative symbolic rehearsal was prevented.

In the test for acquisition, children in all treatment conditions were offered candy reinforcers and social rewards for each matching response that they reproduced correctly.

Table I presents the mean number of matching responses achieved by children in the various treatment conditions. In each incentive condition for both boys and girls, the mean reproduction scores attained by the active symbolizers exceeds the corresponding means for the passive observers who, in turn, show a higher level of acquisition than subjects in the competing symbolization treatment. Analysis of variance of these data reveals that symbolization is a highly significant source of variance. Further comparisons of pairs of means indicate that subjects who

generated verbal equivalents of the modeling stimuli during presentation subsequently reproduced significantly more matching responses than children who either observed passively or engaged in competing symbolization. The latter two groups also differ significantly. However, observational learning was not influenced by incentive set, nor were there any significant interaction effects.

Although the results of the present study provide confirmatory evidence for the facilitative role of symbolization in observational learning, alternative interpretations of these findings might be examined. It is conceivable that the method utilized for preventing the acquisition of representational responses may have interfered with observation of the pertinent

TABLE I
MEAN NUMBER OF MATCHING RESPONSES REPRODUCED AS A FUNCTION
OF SYMBOLIZATION AND INCENTIVE CONDITIONS

Incentive set	Observational conditions		
	Facilitative symbolization	Passive observation	Competing symbolization
No incentive set			
Boys	16.8	14.5	11.5
Girls	17.5	13.2	6.0
Total	17.2	13.8	8.7
Incentive set			
Boys	16.2	15.3	13.0
Girls	14.8	11.7	9.8
Total	15.5	13.5	11.4

stimuli. Considering, however, that the modeling stimuli were projected on a large television screen directly in front of the subject, seated in a dark room, it is improbable that, under such conditions of highly focused attention, concurrent competing verbalization could appreciably reduce the occurrence of observing responses. Indeed, the marked external control of observing responses in all likelihood accounts for the absence of a significant incentive effect on the acquisition of matching behavior.

In situations where a person is exposed to multiple models exhibiting diverse patterns of behavior, knowledge of the reinforcement contingencies associated with the corresponding response patterns, and anticipation of positive or negative reinforcement for subsequent reproduction may exert selective control over the nature and frequency of attending responses.

The effects of incentive set on observational learning would, therefore, be most clearly elucidated by a comparative study involving (a) highly focused observation of a single sequence of modeling stimuli, (b) controlled exposure to multiple models requiring selective attentiveness to the different cues presented simultaneously, and (c) self-selection of frequency and duration of exposure to specific types of models. The latter condition, which corresponds most closely to observational learning in naturalistic situations, would probably maximize the influence of reinforcement-oriented set.

Simultaneous competing verbalizations during observation of pictorial displays would not be expected to interfere too extensively with the development of visual imagery, particularly when the modeling stimuli are highly salient, as in the present experiment. It would therefore be of considerable theoretical significance to determine whether any matching responses could be reproduced if, in addition to preventing the development of verbal associates, visual imaginal responses were likewise precluded masked, or obliterated. Such imagery interference procedures would provide the most decisive evidence as to whether representational mediators are necessary for the achievement of delayed, behavioral reproduction.

II. Behavioral Effects of Exposure to Modeling Stimuli

Results of numerous investigations (Bandura, 1962, 1965a; Bandura and Walters, 1963a) reveal that observation of models' responses and their reinforcing consequences may have several different behavioral effects, some of which have been mentioned earlier. As shown in preceding sections, an observer may acquire topographically novel responses that did not previously exist in his behavioral repertoire. Second, observation of response consequences to the model may produce incremental or decremental changes in existing classes of behavior by modifying the strength of inhibitory responses. Third, observation of another person's behavior may facilitate the occurrence of previously learned but non-inhibited responses through the stimulus enhancement and discriminative functions of modeling cues. In the following sections some of the variables controlling these diverse behavioral outcomes and associated mediating processes will be discussed at length.

A. MODELING EFFECTS

In order to demonstrate experimentally the acquisition of new response patterns through observation, it is necessary for a model to exhibit highly novel responses, and the observer must later reproduce them in a substantially identical form. Any behavior that has a very low or zero probability of occurrence given the appropriate stimulus conditions fulfills the criterion of a novel response.

The basic components that enter into the development of more complex integrated units of behavior are usually present in subjects' behavioral repertoires as products either of maturation or of prior observational learning and instrumental conditioning. Thus, while most of the elements in activities that are typically modeled in imitation experiments have undoubtedly been previously learned, the particular pattern of components in each response may be unique. For example, children can manipulate objects, sit on them, and punch them, and they can produce vocal responses, but the likelihood that a young child would spontaneously place a Bobo doll on its side, sit on it, punch it in the nose, and remark "Pow . . . boom . . . boom" is exceedingly remote (Bandura, 1965b; Bandura *et al.*, 1961). It is likewise highly improbable that children who possess even an extensive linguistic repertoire would ever emit verbal responses such as "weto-smacko" or "lickit-stickit" (Bandura *et al.*, 1963b) in the absence of exposure to a model who exhibited these unique word combinations.

In addition to response formation, acquisition outcomes are revealed when existing integrated patterns of behavior are brought under new stimulus control as a function of observational experiences.

The social transmission of novel responses is demonstrated in a series of experiments (Bandura *et al.*, 1961, 1963a) in which nursery-school children observed adults exhibit unusual forms of physical and verbal aggression, while other groups witnessed nonaggressive models, or had no exposure to any social cues. In a post-exposure test for imitative learning, children who had observed the aggressive models displayed a large number of precisely matching aggressive responses (Fig. 2), whereas such patterns of behavior rarely occurred in either the nonaggressive-model condition or the control group. Additional evidence of modeling effects is provided by experiments employing similar classes of responses (Bandura, 1965b; Hicks, 1965) as well as considerably more complicated patterns and sequences of behavior (Bandura *et al.*, 1965; Bandura *et al.*, 1963b; D. Ross, 1962). At an even higher level of complexity, it has been shown that children can acquire contingencies for self-reinforcement and self-evaluative responses (Bandura and Kupers, 1964; Bandura and Whalen, 1965), judgmental orientations (Bandura and McDonald, 1963), self-imposed delay-of-reward patterns (Bandura and Mischel, 1965), self-directed aversive behavior (Mischel and Grusec, 1965), linguistic structures (Bierman, 1965), and distinctive phonetic variation in verbal behavior (Hanlon, 1964), as a function of brief exposure to the behavior of models. Moreover, responses acquired observationally may be retained over an extended period of time (i.e., six months) even though there is little or no occasion to perform the novel patterns of behavior during the interval (Hicks, 1965).

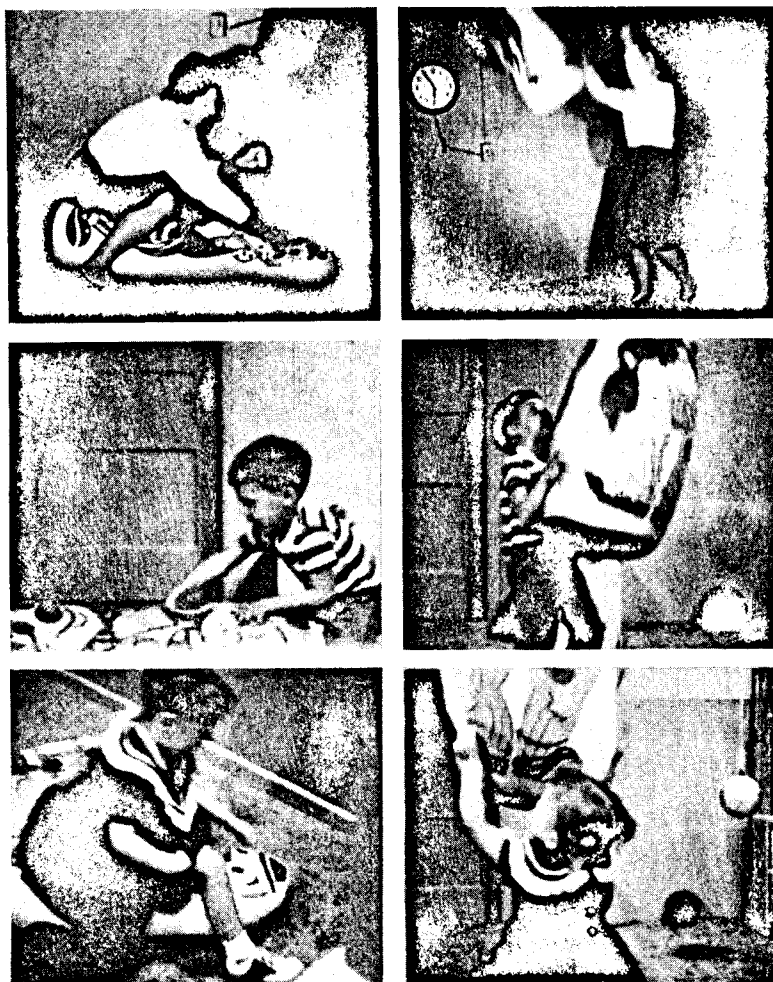


FIG. 2. Photographs of children spontaneously reproducing the behavior exhibited by an aggressive model. (Adapted from Bandura, 1962.)

Considering that the subjects in the experiments cited above had no opportunities to practice the models' responses during the acquisition stage, the process of combining and chaining matching responses must be primarily achieved through central integrative mechanisms.

There have been numerous experiments of observational learning in infrahuman species dating back to the early studies of Thorndike (1898) and Watson (1908). These initial investigations, which were conducted at a time when instinctive interpretations of imitation were in vogue, summarily dismissed the existence of observational learning

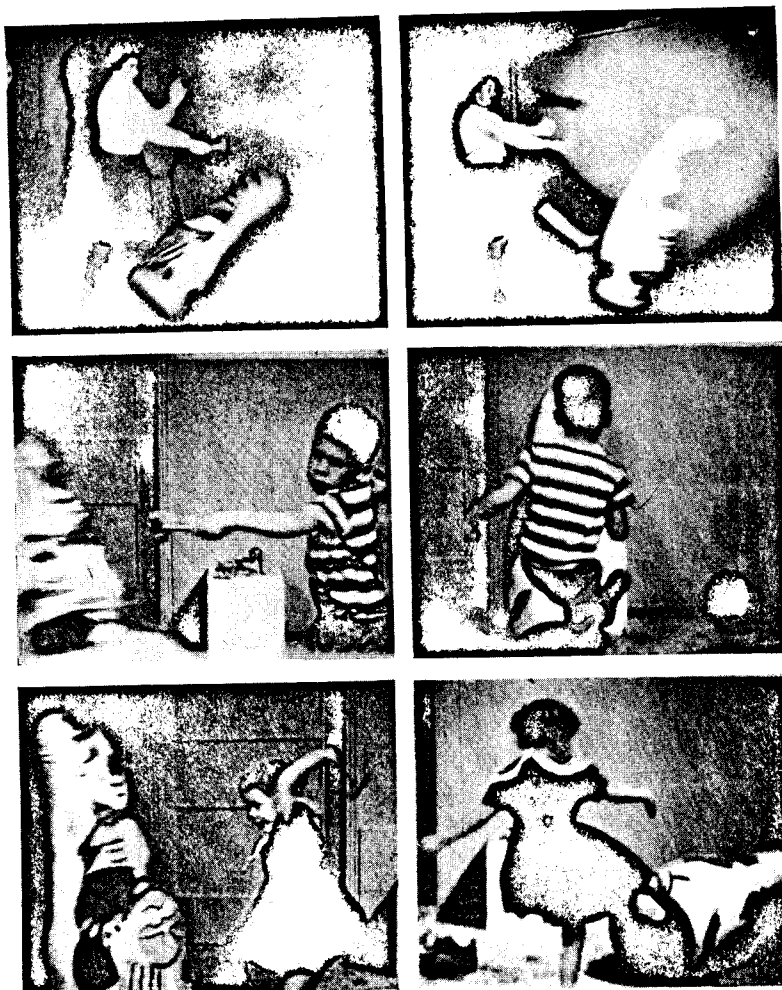


FIG. 2. (Continued)

on the basis of disappointing results from a few animals tested under weak incentives and conditions that failed to ensure adequate observation of the demonstrator's performance. Subsequent studies conducted under more favorable experimental conditions have generally shown that primates can learn to solve manipulative problems (Hayes and Hayes, 1952a; Warden *et al.*, 1940; Warden and Jackson, 1935), and animals of lower order can acquire discriminations (Bayroff and Lard, 1944; Church, 1957; Miller and Dollard, 1941; Solomon and Coles, 1954) and master relatively complex tasks (Herbert and Harsh, 1944) more rapidly through observa-

tion than the original models achieved by trial and error. Moreover, the results of several experiments (Darby and Riopelle, 1959, Herbert and Harsh, 1944) show that the increments in performance resulting from observation are not attributable to the fact that the model's demonstration may have simply enhanced the relevant aspects of the stimulus situation.

The animal experiments, with few exceptions, have involved relatively simple responses that were reproduced either simultaneously or immediately after demonstration. Although relevant comparative data are lacking, it is highly probable that, unlike humans who are capable of acquiring observationally and retaining large, integrated units of behavior, lower species would display a limited capacity for delayed reproduction of modeling stimuli due to sensory-motor deficiencies. Delayed imitation also requires some capacity for symbolization, since the absent modeling stimuli must be retained in representational form. As might be expected, the most striking evidence of observational response learning in animals comes from naturalistic studies of both immediate and delayed imitation of human responses by primates reared in human families (Hayes and Hayes, 1952a, 1952b; Kellogg and Kellogg, 1933). Field studies of primate social behavior (Imanishi, 1957; Kawamura, 1963) likewise provide dramatic illustrations of the manner in which idiosyncratic patterns of behavior can be acquired and transmitted to other members of the subculture through observation.

The available cross-species data thus suggest that the rate and level of observational learning will be governed by the extent to which subjects possess the requisite *sensory capacities* for accurate receptivity of modeling stimuli, the *motor capabilities* necessary for precise behavioral reproduction, and the *capacity for representational mediation and covert rehearsal* which is crucial for successful acquisition and long-term retention of extended, complex sequences of behavior.

Although the findings from studies with humans lend support to a stimulus contiguity theory of observational learning, the fact that the majority of subjects fail to reproduce the entire repertoire of behavior exhibited by the model indicates that contiguity of sensory stimulation is a necessary but not a sufficient condition for imitative response acquisition.

Exposing a person to a complex sequence of modeling stimuli is no guarantee that he will attend closely to the cues, that he will necessarily select from a total stimulus complex only the most relevant stimuli, or that he will even perceive accurately the cues to which his attention is directed. Motivational conditions, prior training in discriminative observation, and the presence of incentive-oriented sets may be influential in

channeling, augmenting, or reducing observing responses. Indeed, the wide individual differences frequently noted in the classes of matching responses that are acquired and reproduced by viewers are probably attributable to differences in these types of subject variables.

Procedures that alter the affective valence (Grusec and Mischel, 1965) and that enhance the distinctiveness (Sheffield and Maccoby, 1961) of modeling stimuli have also been shown to affect the degree of observational learning.

In addition to attention-directing variables and factors influencing rehearsal processes, stimulus input conditions (i.e., the rate, number, distribution, and complexity of modeling stimuli presented to viewers) will regulate acquisition outcomes to some extent. The observer's capacity to process information sets definite limits on the number of modeling cues that can be acquired during a single exposure. Therefore, if modeling stimuli are presented at a rate or level of complexity that exceeds the viewer's receptive capabilities, imitation will necessarily be limited and fragmentary. Under such conditions repeated presentations of the modeling stimuli would be required in order to produce complete and precise response matching. The acquisition of matching responses through observation of lengthy sequences of behavior, and their retention, are also likely to be governed by traditional principles of associative learning such as frequency and recency, serial organization, and multiple sources of associative interference (McGuire, 1961).

Finally, the availability of necessary component responses in the observer's behavioral repertoire will partly determine the rate and level of observational learning. Responses of higher-order complexity are produced by combinations of previously learned components which may, in themselves, represent relatively intricate compounds. Therefore, a person who lacks some of the necessary behavioral elements will, in all probability, display only partial reproduction of the model's behavior, even though the corresponding representational responses have been established. If, on the other hand, the relevant components are already present in the observer's repertoire, he is likely to perform well integrated matching responses following several demonstrations. It is perhaps for this reason that young children, who have greater motor than verbal development, could reproduce a substantially higher percentage (67%) of imitative motor responses (Bandura, 1965b) than matching verbalizations (20%). A similar pattern of differential imitation was obtained in a previous experiment (Bandura and Huston, 1961) in which preschool children served as subjects.

It is evident from the foregoing discussion that an observer does not function as a passive video-tape recorder that registers indiscriminately

and stores cognitive representations of all modeling stimuli encountered in everyday life. Motivational and other attention-directing variables, associative and rehearsal processes, and numerous other factors facilitate or impede observational learning.

B. INHIBITORY AND DISINHIBITORY EFFECTS

In addition to the transmission of novel responses, exposure to the behavior of others may strengthen or weaken observer's inhibitions of existing behavioral repertoires. The occurrence of *inhibitory effects* is indicated when, as a function of observing aversive response consequences to a model, observers exhibit either decrements in the same class of behavior or a general reduction of responsivity. In the experiment to which reference was made earlier (Bandura, 1965b), for example, children who had observed a model's aggressive behavior severely punished performed significantly fewer matching responses than subjects who observed the same behavior either rewarded or associated with no evident consequences. Indeed, the vicarious punishment produced virtually complete suppression of imitative aggression in girls, whose inhibitions over physical forms of aggression are relatively strong to begin with. The inhibited responses were, however, restored to the level of the model-rewarded and no-consequences treatments when the children were offered, under highly permissive conditions, positive reinforcers contingent upon the performance of matching responses.

The findings of a related experiment (Bandura *et al.*, 1963c) reveal that the effects of punishment administered to a model may be quite selective. Whereas the frequency of emission of matching aggressive responses by observers was significantly reduced as a function of witnessing such responses negatively reinforced, other classes of aggressive behavior were essentially unaffected. It might be supposed that more severe intensities of aversive consequences to the model, and longer durations of exposure to the punishment condition, might result in more generalized suppression of responsivity in observing subjects.

The studies referred to above demonstrate the inhibitory effects of observed, negative consequences to a model on the aggressive behavior of viewers. Walters and his associates (Walters *et al.*, 1963; Walters and Parke, 1964) have likewise shown that witnessing a peer model undergo punishment for engaging in prohibited play activities increased observers' resistance to deviation in a similar temptation situation.

In the foregoing experiments the negative reinforcers were administered to the performing model by an external social agent. A highly important but less well understood reinforcement phenomenon characteristic of humans is evident in situations in which a person imposes a

particular response-reinforcement contingency upon his own behavior, and self-administers reinforcers which are under his own control on occasions when he attains or surpasses the self-prescribed standards of behavior. Results of investigations concerned with self-reinforcing processes provide some evidence (Bandura and Kupers, 1964; Bandura and Whalen, 1965) that discriminative patterns of inhibition of self-rewarding behavior can be acquired without the mediation of direct reinforcement, through observation of achievement-contingent rewards and punishments *self-administered* by a model.

Partial or complete inhibition of social responses, established through previous modeling or aversive conditioning, may also be reduced on the basis of observational experience. Such *disinhibitory effects* are evident when observers display increments in socially disapproved behavior as a function of viewing a model either rewarded or experiencing no adverse consequences for performing the prohibited responses.

The reduction of inhibitions through modeling has been demonstrated most clearly in studies of aggression involving intense physical forms such as kicking, striking with mallets, and other pain-producing responses that are likely to be inhibited in viewers as a result of past social training. In a series of experiments Bandura *et al.*, (1961, 1963a) found that children who had observed adult models behaving in a highly aggressive manner subsequently displayed twice as much nonimitative aggression as subjects who either witnessed inhibited adults or had no exposure to social cues (Fig. 3). Numerous other laboratory investigations (Larder, 1962; Lövaas, 1961; Mussen and Rutherford, 1961; Siegel, 1956), differing considerably in choice of both aggressive stimuli and dependent measures, have consistently shown that observation of models displaying aggressive behavior with no untoward consequences increased the incidence of aggressive responses in viewers. Moreover, Walters and Llewellyn Thomas (1963) have demonstrated that the disinhibitory effect of exposure to aggressive models, as measured in terms of subjects' increased willingness to administer painful electric shocks to another person, occurs among adolescents and adults as well.

1. Vicarious Participation in Aggression and Cathartic Processes

According to the widely accepted catharsis hypothesis, vicarious participation in aggressive activities presumably reduces hostile impulses and thereby decreases the probability of subsequent aggressive behavior. The largely negative experimental findings (Bandura and Walters, 1963b; Berkowitz, 1962), however, have led some writers to propose a revision of the original formulation (Buss, 1961; Feshbach, 1961, 1964). They contend that the cathartic or drive-reducing function of aggressive model-

ing stimuli obtains only under certain, specified conditions. Witnessing the behavior of aggressive models supposedly produces decrements in subsequent aggression when the observer has been aggressively aroused at the time of exposure. If, on the other hand, the aggressive drive has not been activated during the period of vicarious participation, such exposure augments ensuing aggressive responses. The revised catharsis theory thus presupposes that the functional properties of modeling stimuli can be radically altered by transitory emotional states of the observer.

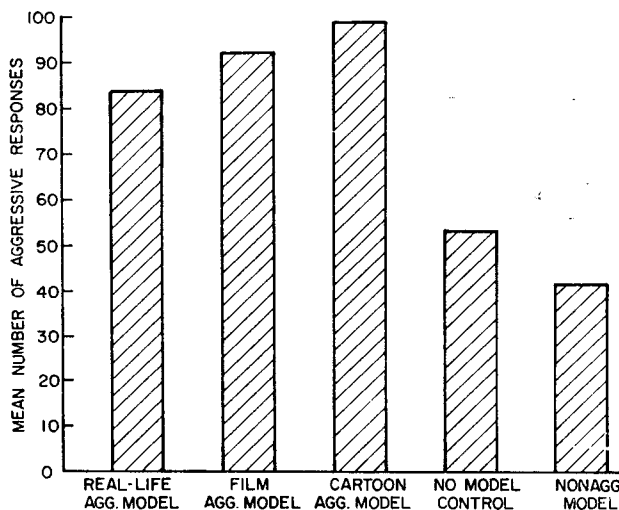


FIG. 3. Mean frequency of aggressive responses performed by control children and by those exposed to aggressive and inhibited models. (Adapted from Bandura, 1963.)

A recent investigation by Hartmann (1965), employing an experimental design in which pre-exposure level of instigation to aggression and types of aggressive cues were both varied, provides data that help to clarify the nature of the relationship between arousal and response to modeled aggression.

An aggressive response sequence generally contains two important stimulus events, i.e., the instrumental aggressive response of the agent, and the pain cues exhibited by the object of the attack. Although a number of investigators have reported changes in subjects' aggressive behavior after viewing film clips depicting fight sequences, no attempt has been made to determine whether the depicted instrumental aggression or the pain cues are primarily responsible for the obtained differences.

It is apparent from the findings of experiments employing inanimate targets such as plastic dolls that observation of instrumental aggression in the absence of pain cues can produce substantial increases in aggressive behavior. The important question, therefore, is whether expressive pain reactions augment or counteract the effects of aggressive displays.

According to the theory of aggression proposed by Sears *et al.* (1957), signs of pain and injury resulting from a child's aggressive behavior occur sufficiently often in conjunction with the removal of his frustrations to have acquired secondary reinforcing properties. Pain cues could, therefore, serve as positive reinforcers to enhance aggressiveness. On the other hand, it would be predicted on the basis of the principle of stimulus generalization that a victim's pain reactions will tend to elicit conditioned emotional responses in the observer and thus lead to aggression inhibition. The problem of determining the functional value of witnessed pain cues is further complicated if conditions of anger arousal affect their reinforcing and anxiety-eliciting properties.

The study conducted by Hartmann objectively assessed the independent and interactive effects of anger instigation, aggressive displays, and pain cues on subsequent interpersonal punitiveness. In the first phase of the experiment, adolescent delinquent boys overheard an anonymous partner (actually a tape-recording) make evaluative statements about their performance on an ego-involving task. The boys in the *aggression-arousal* condition were subjected to a number of unwarranted and disparaging criticisms by the "partner"; in contrast, subjects assigned to the *nonarousal* condition received essentially neutral comments.

Following the experimentally induced arousal the subjects were further subdivided into one of three conditions. In each condition a film was shown which portrayed two adolescent boys shooting baskets on a basketball court. In the *control* film the boys engage in an active but cooperative basketball game, whereas in the other two films the boys get into an argument that develops into a fist fight. The *pain-cues* film focuses almost exclusively on the victim's pain reactions as he is vigorously pummeled and kicked by his opponent. The *instrumental-aggression* film, on the other hand, focuses on the aggressors' responses including angry facial expressions, foot thrusts, flying fists, and aggressive verbalizations.

After exposure to the film sequences the subjects were asked to assist the experimenter in a study ostensibly of the effects of performance feedback on learning rate. The aggression performance task, which was patterned after the device originally designed by Buss (1961), contained a panel with ten shock switches arranged in increasing intensity, and lights that signaled right or wrong responses presumably made by the subject's "partner" in the adjacent room. After the boys sampled several of the

shock intensities to apprise them of the magnitude of aversive stimulation associated with the different switches, the subjects were asked to administer the pain-producing shocks to their partner whenever he made an error on the learning task. They were free, however, to vary the intensity and duration of shock administration. During the series of learning trials, the subjects' panel signaled a number of errors according to a prearranged program controlled by the experimenter, and the length and intensities of shocks inflicted upon the partner were recorded.

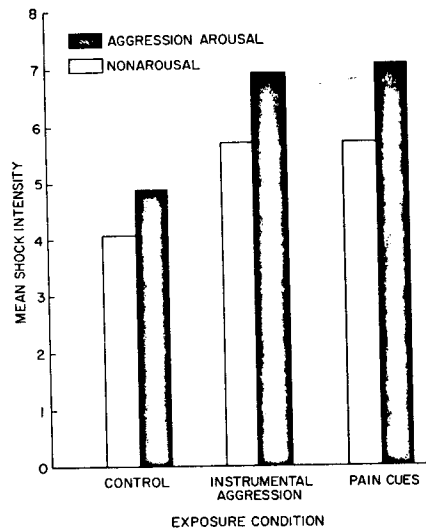


FIG. 4. Mean shock intensities administered by aroused and nonaroused subjects after observing either instrumental aggression, pain cues, or a nonaggressive control film. (Adapted from Hartmann, 1965.)

The results of this experiment, based on several indices of punitiveness, are contrary to the catharsis hypothesis, but entirely consistent with social-learning theory. Subjects who had observed either the aggressive acts or the pain cues selected significantly higher shock levels, both under aroused and nonaroused conditions, than subjects who watched the control film (Fig. 4). Moreover, angered viewers behaved more aggressively than nonangered observers following exposure to the aggressive film sequences, a finding that is directly counter to prediction from a catharsis hypothesis. Prior arousal also produced an increase in aggression in control subjects, but not of statistically significant magnitude. The latter finding provides additional suggestive evidence for the influential role of the aggressive

stimulus value of the target person and modeling cues in determining aggressive modes of response to emotional arousal (Bandura and Walters, 1963a; Berkowitz, 1964; Schachter and Singer, 1962).

In the present experiment, the initially offensive behavior of the "partner" was not only anger-provoking, but also served to increase his aggressive cue value. According to a recent theory proposed by Berkowitz (1964), the effects of pictorially modeled aggression are a joint function of the observer's level of internal arousal and the target person's cue properties which are treated as eliciting stimuli analogous to the ethological concept of "releaser." Under low arousal a powerful releaser is presumed to be necessary to elicit aggressive responses, whereas a relatively weak external stimulus will suffice under high instigation to aggression. The importance of external stimuli in governing the effects of exposure to film-mediated models is clearly demonstrated in a series of experiments by Berkowitz (Berkowitz, 1965; Berkowitz and Geen, 1965; Geen and Berkowitz, 1965) in which the aggressive cue value of the target person was varied by assigning him either an aggressive vocational label (e.g., boxer, speech major) or the first name of the aggressive film model. The findings reveal that witnessing assaultive behavior significantly increased viewers' aggressiveness only when they were aroused and provided a target possessing cue properties. The fact, however, that modeling augmented the intensity of punitive behavior in Hartmann's study in nonaroused subjects toward a considerate target suggests that the generality of Berkowitz's findings may be primarily confined to highly socialized college samples.

Although subjects in the instrumental-aggression and pain-cues conditions administered virtually identical intensities of pain-producing responses, the latter two groups displayed differential patterns of punitive behavior based on the shock-level \times duration index (Fig. 5).

Aroused subjects in the instrumental-aggression and the control groups did not differ from their nonangered counterparts in overall level of aggressiveness. On the other hand, nonaroused subjects who had observed the suffering victim subsequently exhibited a relatively low degree of pain-producing behavior, and did not differ significantly in this respect from the controls. In marked contrast, angered viewers became extremely punitive as a function of witnessing another person beaten severely.

In a study of cathartic effects through vicarious experience, Feshbach (1961) found that adults who had been initially subjected to critical remarks and then had viewed a prize fight sequence, produced fewer aggressive responses to a word association test and questionnaire than insulted subjects who had watched a film depicting the consequences of the spread of rumors. No significant differences were obtained, however, between groups of subjects exposed to the aggressive film or to the rumor movie

under nonaroused conditions. While these findings are frequently cited as evidence for the cathartic reduction of aggression, alternative interpretations should be considered, particularly in view of the fact that some of the findings are inconsistent with both the catharsis hypothesis and the results of numerous investigations published in recent years.

Considering that exposure to aggressive stimuli has generally been shown to increase aggressive behavior in young children (Bandura *et al.*, 1961, 1963a; Larder, 1962; Lövaas, 1961; Mussen and Rutherford, 1961),

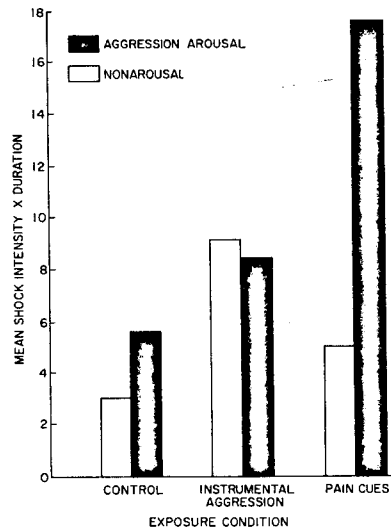


FIG. 5. Mean pain-producing responses (shock level \times duration) displayed by aroused and nonaroused subjects after observing either instrumental aggression, pain cues, or a nonaggressive control film. (Adapted from Hartmann, 1965.)

adolescents (Hartmann, 1965; Walters and Llewellyn Thomas, 1963), and adults (Walters and Llewellyn Thomas, 1963), the failure to obtain an enhancement effect of an aggressive film under *nonaroused* conditions in Feshbach's experiments suggests that either the dependent measure has serious limitations, or the content of the control film did not provide a sufficiently neutral stimulus. The interpretation of the difference obtained between subjects in the *aroused* condition is similarly complicated by the fact that the control movie, which was concerned with the negative effects of rumors, may have been somewhat anger-provoking to the viewers.

The experiments cited above have, almost without exception, employed measures of overt physical aggression. In contrast, verbal responses

to questionnaires or word association tests, and measures obtained from ratings of attitudes toward psychological experiments and toward the experimenter, are not only somewhat ambiguous indices of aggressive behavior, but also subject to social desirability response sets which may seriously affect results (Bandura and Walters, 1963b).

It is also by no means clear whether decrements in aggression, when they occur under certain circumstances as a function of witnessing physical violence, reflect a genuine drive-reduction process, the effects of an inhibitory process generated by displays of violence and its injurious consequences, or some other mechanism (Berkowitz, 1962; Berkowitz and Rawlings, 1963). A study of vicarious reduction of hostility by Rosenbaum and deCharms (1960), for example, demonstrated that insulted subjects who heard a third person reply to the original aggressor later evaluated the aggressor less negatively. This outcome, however, is certainly not attributable to a reduction of hostility, since, as the authors point out, the replies rarely contained any aggressive verbalizations.

The growing body of research provides considerable evidence that vicarious participation in aggressive activities can be highly effective in modifying observers' aggressive behavior, but not in the direction predicted by the catharsis hypothesis. These findings are perhaps not too surprising. It is highly improbable that even advocates of vicarious drive reduction would recommend community programs in which sexually aroused adolescents are shown libidinous movies at drive-in theatres as a means of reducing sexual behavior; famished persons are presented displays of gourmands dining on culinary treats in order to alleviate hunger pangs; and assaultive gangs are regularly shown films of assailants flogging their antagonists in an attempt to diminish aggressive behavior. Such procedures would undoubtedly have strong instigative rather than reductive consequences.

The persistence of the belief in cathartic energy discharges through vicarious participation despite substantial, negative experimental findings, is probably supported by frequent subjectively experienced "tension" reduction following exposure to aggressive content provided in films, televised programs, and other audiovisual displays. There is no disputing the fact that a person who is in a state of heightened emotionality resulting from stressful and frustrating everyday events is apt to undergo some reduction in general arousal level as a function of observing aggressive performances. While such an outcome is generally interpreted as evidence of vicarious reduction in "pent-up" affects and impulses, a more plausible alternative explanation is in terms of stimulus-change processes.

After a person has been insulted, unjustly criticized, or otherwise thwarted, the resultant emotional arousal is typically revived and even

augmented on later occasions through symbolic reinstatement of the anger-provoking incidents. Thus, by brooding over the ill treatment and possible negative consequences of disturbing episodes, intense feelings can be reinstated long after the initial reactions to the situation have subsided. The persistence of elevated arousal, according to this social-learning view, is attributable to self-generated stimulation rather than to the existence of an undischarged reservoir of "aggressive drive." If the person should become immersed in new activities that supersede the preoccupying, internal eliciting stimuli, a noticeable degree of "tension" reduction will, in all likelihood, take place. On the supposition that the diminution of emotional arousal is a consequence of *attentional shifts* rather than a cathartic effect of having experienced aggression vicariously, one would expect aroused subjects to experience equally salutary effects from getting involved in an absorbing book, a movie, a stage play, or a televised program containing few, if any, aggressive stimuli. In order to test predictions derived from the *stimulus-change* and the *energy-discharge* conceptualizations of emotional "cathartic" effects, a study is planned in which decrements in physiological arousal will be compared in angered subjects who are exposed to movies either depicting aggression, with equally absorbing but nonaggressive content, or are presented no pictorial stimuli. The results of this experiment should throw some light on the influence of aggressive stimulus events and attentional shifts to nonaggressive competing stimuli in reducing viewers' pre-existing levels of emotional arousal.

2. *Modification of Resistance to Deviation Through Modeling*

The preceding discussion has been specifically concerned with changes in the incidence of aggressive responses resulting from observation of the behavior of aggressive models and its response consequences. Inhibitory and disinhibitory effects, however, are not confined to aggression. The frequency of other socially disapproved classes of behavior has likewise been experimentally modified through witnessing models violating prohibitions.

Studies by Grosser *et al.* (1951) and by S. A. Ross (1962), for example, have demonstrated that exposure to transgressors increases the probability that the observer will likewise deviate. On the other hand, conforming models tend to strengthen the observer's self-controlling responses, and thereby reduce conflictive behavior in temptation situations (Ross, 1962). Blake and his associates (Blake, 1958) have conducted investigations of some of the conditions determining the influence of noncompliant and conforming models on observers' inhibitions in prohibition situations. In one study, Freed *et al.* (1955) found that, although exposure to a non-

compliant model lowered students' resistance to deviation, transgressions occurred most frequently if the restriction was weak and the model violated the prohibitory signs, whereas the combination of a strong restriction and a conforming model produced the lowest incidence of deviation. A second experiment (Kimbrell and Blake, 1958) demonstrated that the efficacy of modeling cues for modifying inhibitions varies with the observer's level of instigation to transgression. That is, under extreme provocation, subjects disregarded both the imposed restriction and the conforming model. However, under conditions where the instigation was not so strong as to force deviation, students who observed a conforming model displayed more compliant behavior than subjects who witnessed a model violate the prohibition.

In the studies referred to above, the probability of deviation was significantly altered simply as a result of witnessing the model's behavior. Inhibitory and disinhibitory effects can be greatly influenced by observation of rewarding and punishing consequences associated with deviant responses. For example, in experiments cited earlier (Walters *et al.*, 1963; Walters and Parke, 1964) children who observed a peer model either being rewarded or experiencing no evident consequences for performing a prohibited act were more likely to deviate than children who witnessed the model being punished for engaging in the same behavior.

In naturalistic situations the observer often actually witnesses the rewards or punishments immediately following the model's transgressions. At other times, however, he can only infer probable consequences from discriminative symbols and attributes of the model that tend to be correlated with differential reinforcements. The manner in which distinctive modeling cues signifying likely reinforcing outcomes may increase a model's effectiveness in reducing inhibitions is illustrated in an experiment conducted by Lefkowitz *et al.* (1955). Traffic signal violations by a high-status person attired in a freshly pressed suit, shined shoes, white shirt and tie produced a higher pedestrian violation rate than the same transgression performed by the same model dressed in soiled, patched trousers, scuffed shoes, and a blue denim shirt. The differential reduction in restraints noted in the latter experiment is probably attributable to the fact that transgressions by persons who occupy a high position in a prestige hierarchy are likely to be punished less frequently and less severely than those performed by low-status transgressors. The differential leniency is apt to apply to the imitator as well, provided that the matching behavior is performed in the presence of the deviating model.

Other discriminative properties of the model, such as age, sex, socioeconomic status, social power, ethnic background, and intellectual and vocational status, which are associated with predictable contingencies of

reinforcement, may likewise influence the extent to which prohibited acts will be imitated.

3. Conceptualization of "Vicarious Reinforcement"

A number of the studies discussed in preceding sections provide evidence of vicarious reinforcement effects, as shown by the fact that the behavior of observers is modified as a function of witnessing reinforcing stimuli administered to performers. Indeed, systematic investigations of the relative efficacy of vicarious and direct reinforcement reveal that the changes exhibited by observers are of the same magnitude (Kanfer and Marston, 1963) or, under certain conditions, may even exceed those achieved by reinforced performers (Berger, 1961). Moreover, vicarious reinforcement processes are governed by variables such as the percentage (Kanfer, 1965; Marston and Kanfer, 1963), intermittency (Rosenbaum and Bruning, 1961), and magnitude (Bruning, 1965) of reinforcement in essentially the same manner as when they are applied directly to a performing subject.

While the efficacy of vicarious reinforcement procedures is well established, the response changes exhibited by observers may be interpreted in several ways. One possible explanation is in terms of the discriminative function of reinforcing stimuli presented to the model. Response consequences experienced by another person undoubtedly convey information to the observer about the probable reinforcement contingencies associated with particular performances in similar situations. Knowledge concerning the types of responses that are likely to meet with approval or disapproval can later serve as discriminative stimuli in facilitating and inhibiting overt behavior. The information gained from witnessed consequent events may be particularly influential in regulating behavior under conditions where there is considerable ambiguity as to what constitutes permissible or punishable actions.

In most investigations of vicarious reinforcement the model merely performs a prearranged sequence of responses in the absence of any discriminative environmental cues. In many situations, however, the model responds differentially to certain salient or ambiguous cues within a total stimulus complex. Under these circumstances, observation of the pattern of reinforcement associated with the model's responses helps to direct the observer's attention to the critical environmental stimuli which would be difficult to distinguish without the observed informative feedback. The observer's responses may thus become conditioned not only to the model's responses, but also to the relevant environmental stimuli. The resultant discrimination learning can later facilitate the performance of matching

responses by the observer in the presence of cues to which the model previously had been responding (Church, 1957; McDavid, 1962).

Observation of reinforcing stimuli presented to a model and his concomitant affective reactions may also have important motivational effects on the observer. The mere sight of highly valenced reinforcers can produce anticipatory arousal which, in turn, will affect the level of imitative performance. Thus, for example, witnessing a performer rewarded with a succulent beefsteak for executing a given sequence of responses will convey the same amount of information about the probable reinforcement contingencies to a famished and to a satiated observer, but their subsequent imitative performances will, in all likelihood, differ radically because of the differential effects of deprivation state on the activating power of the anticipated incentive. Similarly, variations in the magnitude of observed reinforcers, while providing equivalent information about the permissibility of matching responses, have different motivational effects on observers (Bruning, 1965). As in the case of direct reinforcement, incentive-produced motivation in observers is most likely to affect the speed, intensity, and persistence with which matching responses are executed.

A vicarious reinforcement event not only provides (1) information concerning probable reinforcement contingencies, (2) knowledge about the controlling environmental stimuli, and (3) displays of incentives possessing activating properties, but it also includes affective expressions of the rewarded or punished performer. As will be shown later, the pleasure and pain cues emitted by a model generally elicit corresponding affective responses in the viewer. These vicariously aroused emotional responses can readily become conditioned, through repeated contiguous association, either to the modeled responses themselves, or to environmental stimuli (Bandura and Rosenthal, 1965; Berger, 1962) that are regularly correlated with the performer's affective reactions. As a consequence, the subsequent initiation of matching responses by the observer or the occurrence of the correlated environmental stimuli is likely to generate some degree of emotional reactivity. It is therefore possible that the facilitative or suppressive effects of observing the affective consequences accruing to a performer are partly mediated by the arousal of vicariously acquired emotional responses.

In similar manner, witnessing the nonoccurrence of anticipated aversive consequences to a model can extinguish in the observer previously established conditioned emotional responses (Bandura and Rosenthal, 1965). It is informative to note in this connection that, when socially disapproved behavior exhibited by a model is followed by neither reward nor punishment, the incidence of matching deviant behavior is comparable

to that produced by observation of rewarding consequences (Bandura, 1965b; Walters and Parke, 1964). These data suggest that nonreaction to formerly prohibited activities takes on, through contrast, positive qualities. Similar contrast-of-reinforcement effects have been demonstrated in studies of direct reinforcement (Buchwald, 1959a,b; Crandall, 1963; Crandall *et al.*, 1964) in which nonreward following punishment had functioned analogously to a positive reinforcer, whereas the occurrence of nonreward subsequent to a series of rewards had functioned as a negative reinforcer. In fact, even a weak, positive reinforcer, when contrasted with more rewarding prior events, may acquire negative reinforcing value (Buchwald, 1960).

The incremental changes produced in observers by the omission of anticipated punishment of the model may, of course, be attributed to several factors that are difficult to separate. In addition to weakening inhibitions through vicarious extinction, nonreactions also have informative value concerning the permissibility of the modeled responses.

C. RESPONSE FACILITATING EFFECTS

The behavior of models often serves merely as discriminative stimuli for the observer in facilitating the occurrence of previously learned responses in the same general class. Response facilitating effects are distinguished from disinhibition and modeling by the fact that, in the former case, no new responses are acquired, and disinhibitory processes are not involved since the exhibited responses have rarely, if ever, incurred punishment. A familiar example of this type of outcome is provided in situations where a person gazes intently skyward and most passers-by respond in a similar manner.

In laboratory experiments with humans, a wide variety of socially approved behaviors, such as volunteering services or monetary contributions (Blake *et al.*, 1955; Rosenbaum, 1956; Rosenbaum and Blake, 1955; Schachter and Hall, 1952), pledging oneself to a course of action (Blake *et al.*, 1956; Helson *et al.*, 1956), and preferences for certain types of foods (Duncker, 1938) and pictorial items (Gelfand, 1962), have been readily induced by the presentation of actual or symbolic modeling stimuli. Some of the most influential theoretical formulations of imitative processes (Miller and Dollard, 1941; Skinner, 1953) have, in fact, been almost exclusively concerned with the discriminative function of social cues. In the prototypic experiment the model's responses serve as the occasion upon which another organism is likely to be reinforced for displaying the corresponding patterns of behavior. After a period of exposure to differential reinforcement, imitative tendencies become strongly established; conversely, by reversing the social contingencies so

that matching responses are never reinforced but nonmatching behavior is consistently rewarded, imitateness is reduced to a very low or zero level (Miller and Dollard, 1941).

Ethologists provide extensive documentation of the response facilitating function of social cues in birds, fish, and mammals (Hall, 1963; Thorpe, 1956). Typically, the sight of certain responses performed by an animal elicits a similar or identical pattern of behavior in other members of the same species. This process is generally referred to as "social facilitation" or "behavioral contagion" when it is presumably determined by prior discriminative reinforcements, and "mimesis" when corresponding unconditioned response patterns are supposedly instinctively aroused.

As Hinde (1953) points out, the occurrence of matching behavior in animals is often erroneously attributed to mimetic processes. In the first place, what appears to be mimetic behavior may, in fact, involve response patterns that have been established through prior social learning. Even in cases where matching behavior is clearly instinctive, it is frequently difficult to determine whether social cues constitute the critical eliciting stimuli. Readily discriminable "sign stimuli" (Tinbergen, 1951) or "releasers" (Thorpe, 1956) in the form of color displays, preparatory movement sequences, postural cues, and specific vocalizations frequently serve as unconditional stimuli for complete patterns of instinctive behavior in other members of the species. Therefore, when appropriate releasing stimuli are displayed by a model during the performance of a given activity, the corresponding responses on the part of observing animals may be primarily controlled by releasing stimuli, rather than the model's behavioral cues. Thus, for example, the white tail feathers of a bird flying upward can function as flight-eliciting stimuli for other members of a flock (Armstrong, 1942). A suitably feathered but non-flying artificial model might likewise succeed in getting a flock of birds airborne.

Pseudo-mimesis is also evident in instances where the model's behavior directs the observer's attention to environmental stimuli which, in turn, elicit similar innate response patterns. Satiated chickens, for example, will begin to eat at the sight of other birds feeding (Katz and Révész, 1921). It is entirely possible that in such cases modeling cues primarily serve an *orienting function*, whereas the consummatory responses of the sociable chicks are reinstated and maintained by the grain to which their attention has been redirected. The fact that the stimulus complex to which observing animals are responding frequently contains, in addition to social cues, releasing stimuli and other controlling environmental events complicates the identification and analysis of genuine mimetic phenomena.

The behavior of a model may not only function as a discriminative stimulus for a similar response, but it also serves to direct the observer's

attention to the particular stimulus objects manipulated by the performer (Crawford and Spence, 1939). As a consequence, the observer may subsequently utilize the same objects to a greater extent, though not necessarily in an imitative way. In one modeling experiment, for example, the model pummelled a plastic doll with a mallet. Children who had observed this aggressive act later displayed significantly more behavior in which they pounded a peg board with the mallet than both control subjects and those who had viewed a nonaggressive model (Bandura, 1962). *Stimulus enhancement effects* are distinguished from social facilitation in that the observer's behavior in the former case may bear little or no resemblance to the model's activities.

III. Vicarious Classical Conditioning

The investigations reviewed in the preceding sections have been essentially confined to the social transmission of instrumental classes of responses as a function of exposure to real-life or symbolic models. 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. Indeed, most persons exhibiting snake phobias have never had any direct aversive experiences with reptiles, and similarly, children often acquire, on the basis of exposure to modeled stimulus correlations, intense emotional attitudes toward members of unpopular minority groups or nationalities with whom they have little or no personal contact. Positive incentive learning may likewise occur on a vicarious basis by observing others experiencing positive reinforcement in contiguous association with discriminative stimuli.

A. VICARIOUS EMOTIONAL AROUSAL

One of the earliest studies of vicarious affective arousal was reported by Dysinger and Ruckmick (1933), who measured the autonomic responses of children and adults to movie scenes depicting dangerous situations and romantic-erotic displays. A more recent demonstration of vicarious emotional instigation through filmed stimulation is provided in a series of experiments by Lazarus and his associates (1962). Continuous recordings of subjects' autonomic responses were obtained while they viewed a film portraying a primitive ritual of an Australian tribe in which a pubertal native boy underwent a crude genital operation. The college students displayed heightened autonomic responsivity while witnessing the genital subincision scenes, the reactions being particularly marked when the operation was accompanied by sobs and other pain

cues on the part of the young initiate. Both the deletion of the vocal pain cues and the provision of sound-track commentaries that minimized the aversiveness of the depicted operation significantly reduced the subjects' level of emotional arousal, whereas commentaries highlighting the suffering and hazards of such operations enhanced observers' physiological arousal (Speisman *et al.*, 1964).

In an erudite analysis of vicarious processes, Berger (1962) restricts the phenomenon of vicarious instigation to situations in which an observer responds emotionally to a performer's presumed affective experiences. Since the emotional state of another person is not directly observable, its presence, quality, and intensity are typically inferred from stimuli impinging upon the performer and behavioral cues indicative of emotional arousal. As Berger points out, a person may be vicariously instigated on the basis of erroneous inferences primarily from stimulus events, as in the case of a mother who responds fearfully at seeing her child fall even though the child is, in fact, unhurt and undisturbed. Similarly, a bystander may react apprehensively to hearing a sudden, loud scream although, unknown to him, the distressing vocalizations are simulated as part of a game.

Berger has reasoned that a loud scream which elicits a fear response from the observer may represent a case of pseudovicarious instigation, since the vocal cue may serve merely as a conditioned fear stimulus independent of the performer's unconditioned emotional response or stimulus situation. The basis for this distinction is debatable, since expressive cues are the observable indicants of a performer's assumed emotional state and, as will be shown later, it is precisely because such social cues have acquired emotion-provoking properties that an observer can be at all vicariously aroused by the experiences of another person. There are, however, instances in which covariations in the emotional responses of observers and performers do not necessarily involve vicarious-instigation processes. Once a given environmental stimulus has acquired strong eliciting potency for an observer, his emotional responses are likely to be evoked directly by the nonsocial conditioned stimulus, regardless of the behavior of others. Thus, for example, individuals will experience fear upon hearing the sound of a fire alarm in the building in which they are working, although, due to common conditioning histories, each person may be responding similarly, but independently, to the same nonsocial cues. Under these circumstances it is exceedingly difficult to establish precisely the stimulus sources of the observer's emotional state since the behavior of others, depending on its character, undoubtedly augments or reduces the effects of environmental eliciting stimuli. The most convincing demonstration of vicarious instigation is, therefore, provided under condi-

tions where the observer's emotional responses are elicited entirely by the performer's affective expressions, because the latter's evocative stimuli either are unobservable to, or of neutral valence for, the observing subject.

Social cues signifying affective arousal can acquire emotion-provoking properties through essentially the same process of classical conditioning that is involved in the establishment of positive or negative valences to nonsocial environmental stimuli. That is, if affective responses of others have been repeatedly followed by emotional experiences on the part of observers themselves, the affective social cues alone gradually acquire the power to instigate emotional reactions in observers. The clearest demonstrations of vicarious arousal are furnished by laboratory studies with infrahuman subjects in which the requisite social and temporal contingencies are instituted.

In testing the conditioning interpretation of the development of "sympathetic" responses, for example, Church (1959) either subjected groups of rats to paired aversive consequences, unpaired consequences, or assigned them to a control condition in which no aversive stimuli were presented. In the paired-consequences condition, animals were administered brief shocks after another rat had been shocked for thirty seconds, with the aversive stimulation to both animals being terminated simultaneously. Animals in the unpaired-consequences condition received the same number of brief shocks, but these were not temporally associated with painful stimulation to another rat. Following the emotional conditioning phase of the experiment, decrements in the animals' rate of bar-pressing for food, which served as the index of vicarious fear arousal, were measured in response to the pain reactions of another rat that was continuously shocked in an adjacent cage. Animals that had previously experienced paired consequences were markedly affected by the pain responses of another rat, the control group showed little empathetic responsivity, and animals whose past aversive experiences were unassociated with the pain responses of another member of their species showed an effect intermediate between the two groups.

The manner in which vicariously instigated emotions may motivate avoidance responses is illustrated in experiments by R. E. Miller *et al.* (1962, 1963) employing a cooperative, avoidance-conditioning procedure. Rhesus monkeys were first trained to avoid an electric shock by pressing a bar whenever a stimulus light appeared. Following the avoidance training, the animals were seated in different rooms, with the bar removed from the chair of one monkey and the stimulus light from the other. Thus, the animal having access to the conditioned stimulus had to communicate by means of affective cues to his partner, equipped with the response bar, who could then perform the appropriate instrumental response that

would enable both animals to avoid aversive stimulation. Distress cues exhibited by the stimulus monkeys in anticipation of shock were highly effective in eliciting fear in their observing companions as reflected in rapid performance of discriminated avoidance responses. Moreover, mere exposure to a monkey reacting in an apprehensive or fearful manner could reinstate avoidance responses in the observer after they had been extinguished to a zero level (R. E. Miller *et al.* 1959).

B. VICARIOUS CLASSICAL CONDITIONING

The foregoing studies identify the contingencies under which emotional responses of a model, as conveyed through auditory cues, facial expressions, and postural manifestations, acquire the capacity to arouse empathetic emotional responses in observers. In the case of vicarious classical conditioning, the observers' vicariously elicited emotional responses become conditioned, through contiguous association, to formerly neutral stimuli. One of the earliest laboratory investigations of this process was reported by Kriazhev (1934), who conditioned one animal in each of seven pairs of dogs to stimuli presented in conjunction with food or electric shock, while the other member of the pair merely witnessed the procedure. The observing dogs rapidly developed salivary responses to the signal for food, and conditioned agitation and respiratory changes to that for shock. However, this brief report does not contain sufficient information on the details of the experimental procedure to determine whether the observers' reactions to the conditioned stimulus were tested in the absence of the models.

In laboratory investigations of vicarious classical conditioning in humans (Barnett and 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.

Berger (1962) has recently conducted a series of studies in each of which one group of observers was informed that the performing model would receive a shock whenever a light dimmed, the dimming of the light being in each trial preceded by a buzzer. A second group of observers was instructed that the performer would make a voluntary arm movement whenever the light dimmed but that the performer was receiving no aversive stimulation. In two other conditions the model was supposedly shocked

but refrained from making arm movements, or the model was neither shocked nor exhibited arm withdrawal responses. The measure of vicarious conditioning was the frequency of observers' galvanic skin responses to the buzzer, which served as the conditioned stimulus. Observers who were informed that the model was receiving aversive stimulation and who witnessed the model make avoidance responses displayed a greater degree of vicarious conditioning than observers in the other three groups. Had the models exhibited additional nonverbal and vocal pain cues characteristically associated with actual aversive stimulation, the vicarious conditioning effects would probably have been even more marked.

Although the phenomenon of vicarious conditioning has been clearly demonstrated, wide interindividual variability has been noted in the acquisition rate and stability of vicariously acquired conditioned responses. Since this process requires the observer to experience vicariously another person's pain responses, thereby producing emotional arousal in the observer, variables that influence an observer's general level of emotional arousal are likely to enhance or retard vicarious learning.

There are numerous investigations of *direct* aversive classical conditioning as a function of subjects' arousal level in which arousal is either manipulated by varying the intensity of unconditioned and stressor stimuli, or assessed in terms of personality measures of emotional proneness. These studies have shown that conditioned responses are developed more rapidly and, once acquired, extinguish less readily under conditions of high, as compared to low, arousal (Doerfler and Kramer, 1959; Spence, 1958, 1964). From these 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 inter-server, variables that influence an observer's general level of emotional state (Schachter, 1964; Schachter and Singer, 1962; Schachter and Wheeler, 1962) indicates that administration of epinephrine, a sympathetic stimulant, may enhance observers' susceptibility to modeling influences. In particular, when given epinephrine 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 psychological arousal, or who 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 that rats injected with epinephrine displayed considerably more fear in response

to aversive stimuli than placebo- or chlorpromazine-injected animals. However, available evidence (Latané and 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 responses, suggesting a non-monotonic relationship between autonomic arousal and conditioned emotional responses.

In order to determine the effects of varying degrees of arousal, manipulated both psychologically and physiologically, on vicarious conditioning processes, an experiment was conducted (Bandura and Rosenthal, 1965) that proceeded in the following manner. College students participated in a vicarious aversive conditioning paradigm in which a model emitted pain cues in conjunction with an auditory stimulus, and the observers' acquisition and extinction of galvanic skin 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 experience 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 sizeable sympathetic arousal.

The two sets of experimental manipulations thus provided 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 cc and .5 cc, with the placebo injection condition serving as a 0 dosage group).

Immediately after the arousal manipulations the subjects observed the model, a confederate of the experimenter, perform on a pursuit rotor apparatus which served as the cover task for presenting the CS-UCS pairings to the model. At periodic intervals a buzzer, which served as the CS, was sounded, and shortly thereafter the model suddenly flexed

his arm, dropped the stylus, and winced, creating the impression that painful shock had been delivered. Six CS-alone trials were interspersed among the ten 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. At the completion of the acquisition-test series all subjects were given ten extinction trials in which the CS was presented alone.

Figure 6 shows the percentage of the total number of conditioning trials in which subjects from the various groups exhibited GSR responses.

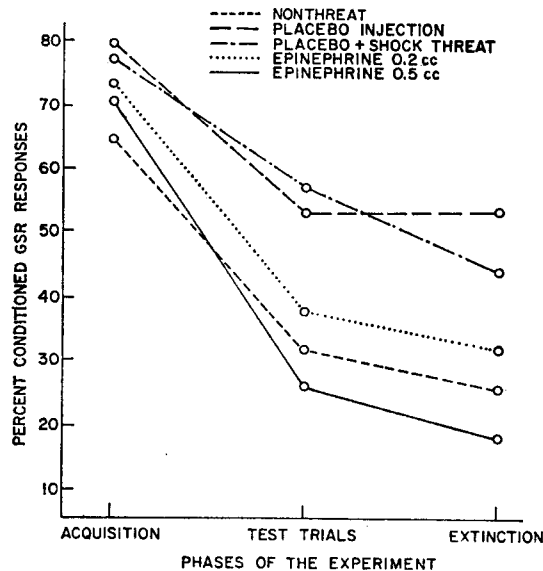


FIG. 6. Mean % conditioned GSR responses exhibited by subjects on each of three test periods for each of five treatment conditions representing differential levels of arousal. (Adapted from Bandura and Rosenthal, 1965.)

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 during the acquisition trials, and did not differ significantly in this respect. As can be seen from the test-trial scores in Fig. 6, however, the auditory stimulus itself had acquired differential aversive properties among groups of observers subjected to varying degrees of arousal. The differential vicarious conditioning revealed in the test trials is even more pronounced in the extinction phase of the experiment. Observers in both the placebo and the shock-threat groups continue to exhibit a significantly

higher level of conditioned responses than either the low-aroused nonthreat group or the high-aroused epinephrine large-dose group.

The overall findings clearly reveal that observers' emotional arousal is a significant determinant of vicarious conditioning. This is demonstrated by the fact that the 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 incremental levels of affective arousal on a single dimension, then the combined results suggest an inverted-U relationship between magnitude of arousal and vicarious conditioning. There are two sets of data that lend some support to this interpretation. First, subjects in the shock-threat group achieved the highest level of vicarious conditioning, 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. Second, within-treatments correlational analyses between a measure of emotional proneness and the vicarious conditioning and extinction scores furnished results that are indicative of a nonmonotonic relationship (Bandura and Rosenthal, 1965).

The failure of 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.

Although the data 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 a post-experimental questionnaire suggested 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.") Most observers attempted to decrease the aversive stimulation arising from the model's pain reactions by conjuring up competing cognitive responses. ("I tried to be cool. I thought about Latin verbs and about Latin composition.") A few subjects, however, marshalled 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 unpleasant arousal by producing competing cognitive responses, or in curtailing attentional responses to the eliciting stimuli, the CS is likely to become endowed with relatively weak aversive properties. The deliberate use of avoidant and stimulus neutralization stratagems was reported most frequently by the most highly aroused subjects.

It should be noted 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 the observer can readily engage in response-interference stratagems that serve to reduce 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 revealed 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 discussed earlier (Church, 1959) reveal that the experience of repeated paired

consequences is an important determinant of vicarious arousal. Moreover, Murphy *et al.* (1955) demonstrated that emotional responses in monkeys could be vicariously elicited not only by the sight of their experimental counterparts, but also through stimulus generalization by another monkey that was never involved in the original aversive contingencies.

The self-report data indicated that with a few notable exceptions subjects did, in fact, experience strong, empathetic 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.") On the assumption that such reactions are established through discordant, interindividual contingencies (Berger, 1962), a study is planned in which the level of vicarious conditioning will be measured as a function of antecedent paired aversive consequences, paired opposing consequences, and unassociated negative outcomes experienced by the model and observing subjects.

C. HIGHER-ORDER VICARIOUS CONDITIONING

In the experiments described above, observers' affective responses to the pain of the models undergoing direct aversive stimulation were conditioned to neutral stimuli. Social attitudes are frequently established on the basis of modeled higher-order pairings in which the names and discriminative attributes of target persons and objects are associated by the model with verbal stimuli likely to evoke in the observer intense, emotional responses on the basis of prior, first-order conditioning. The following quotation, taken from a report of a Ku Klux Klan rally (*San Francisco Chronicle*, 1963), provides a vivid illustration of how fear and hatred of Negroes can be conditioned in this manner and transmitted through modeling to the Klansmen's observant offspring.

The speaker shouted, "In Washington and New York it weren't safe for a white woman to walk the streets by day." "Niggers," the crowd cried out.

There was an attack on the Red Cross for not labelling blood "black and white." Another speaker was introduced as an expert on the subject. He told the people that there was a "round-shaped corpuscle in nigra blood" and that it was a "white child killer when it gets in our blood."

From the platform came attacks on the "black communist conspiracy plot" . . . Shelton (Klan Grand Dragon) said "nigras" constituted 10 per cent of the Nation's population, but were responsible for 80 per cent of the crime, rape, illegitimate births, syphilis, and gonorrhea. . . . The grand commander of the Woman's Klan in Georgia was introduced. She said she was a mother and grandmother and then urged the people to "teach your children the difference between black and white. How do you know who

they'll marry? I'm fighting to keep mine pure and white." A woman sitting in front shook her head slowly. "Those damn niggers," she mumbled. "Damn niggers."

Many of the parents in the crowd had brought their young children to the meeting. On the fringe of the crowd three boys, not more than 10 years old, were playing the old American game of "king-of-the-mountain." They were on a mound of dirt pushing each other from the top. "Down, nigger, you get down there, you nigger," one of them said pushing his friend. "I ain't no nigger, you are," said another, as he scrambled to the top.

In view of the ample opportunities provided children to acquire prejudicial attitudes simply by observing the vehement, emotional responses displayed by bigoted models, it is not surprising that scapegoat theories of prejudice, based on a conflict-displacement paradigm (N. E. Miller, 1944, 1959) have yielded equivocal results (Berkowitz, 1958; Cowen *et al.*, 1959; Lindzey, 1950; Stagner and Condon, 1955; Weatherley, 1961). According to this theory, the objects and strength of displaced aggressive responses can be predicted by knowledge of three variables only—the strength of instigation to aggression by the original frustrating agents, the strength of inhibitory responses, and the degree of dissimilarity of the displaced objects to the original frustrators. This model thus makes no provision for the potentially powerful influence of social agents in transmitting and shaping highly discriminative patterns of prejudicial attitudes toward stimulus objects other than themselves (Bandura and Walters, 1963a). The predictive power of the conflict paradigm is likely to be particularly limited under conditions where the modeling cues and reinforcement contingencies displayed by the primary social agents have no consistent relationship to the similarity of the original frustrators to possible displaced objects.

IV. Vicarious Extinction

Autonomic and instrumental classes of responses can not only be acquired, but also extinguished on a vicarious basis. The latter outcome is achieved by exposing the observer to modeled stimulus events involving either the omission of reinforcement, or the presentation of opposing reinforcing stimuli to the performing subject. Some suggestive evidence for the occurrence of vicarious extinction of conditioned emotionality is provided by Masserman (1943) and Jones (1924) in exploratory studies of the relative therapeutic efficacy of modeling procedures.

Masserman produced strong feeding inhibitions in cats by pairing food approach responses to a conditioned stimulus with either air-blasts, grid-shocks, or both forms of noxious stimulation presented simultaneously. In the remedial phase of the experiment, the inhibited animals

observed a cagemate which had never been negatively conditioned exhibit prompt approach and feeding responses. The observing subjects initially cowered at the presentation of the conditioned stimulus, but with continued exposure to their fearless companion, they advanced, at first hesitantly and then more boldly, to the goal box and consumed the food. Some of the animals, however, showed little reduction in avoidance behavior despite prolonged hunger and repeated modeling trials. Moreover, avoidance responses reappeared in a few of the animals after the normal cat was removed, indicating that in the latter cases the modeling stimuli served merely as temporary external inhibitors of avoidance responses. Jones (1924) similarly obtained variable results in extinguishing children's phobic responses by having them observe their peers behave in a non-anxious manner in the presence of the avoided objects.

In the cases cited above, the models responded to the most aversive stimulus situation at the onset, a modeling procedure that is likely to generate high levels of emotional arousal in observers. Under these conditions any avoidance responses performed by the observing subject that serve to attenuate or terminate the vicariously instigated aversive stimulation will in fact be reinforced rather than extinguished. Therefore, the efficacy of vicarious extinction procedures may depend to a large extent on the care with which the modeled performances are programmed.

Avoidance responses can be rapidly extinguished if subjects are exposed to a graduated series of aversive stimuli that progressively approximate the original intensity of the conditioned fear stimulus (Kimble and Kendall, 1953). In the application of this stimulus generalization principle to vicarious extinction, the subject might initially observe a model responding in a positive manner to relatively weak emotion-provoking cues. After these stimuli have lost their aversive properties for the observer, gradually increasing intensities of anxiety-arousing stimuli can be presented to the model until the most potent cues have been successfully neutralized.

If emotion-eliciting stimuli are repeatedly associated with positively reinforcing events, the former cues are likely to lose their aversive properties more rapidly than through mere repeated, nonreinforced presentation (Melvin and Brown, 1964; Wolpe, 1958). The induction of competing positive responses in observers during exposure to modeling trials may likewise expedite the vicarious extinction process. The latter principles and other factors known to facilitate extinction were systematically applied in an investigation of group vicarious extinction of dog phobias in young children (Bandura *et al.*, 1965b).

The strength of avoidance responses toward dogs was measured by a standardized situational test in which children were instructed to engage in increasingly intimate interactions with a dog. Children who displayed

avoidance responses were grouped into stratified levels of avoidance behavior and then assigned to one of four conditions.

One group of children participated in eight brief modeling sessions in which they observed a fearless peer model exhibit progressively longer, closer, and more active interactions with his canine companion. For these subjects, the modeled approach behavior was presented within the context of a highly positive, party atmosphere. A second group of children was exposed to the same graduated modeling stimuli, but in a neutral context.

In the latter two treatment conditions, the stimulus complex involved both modeling cues and repeated observation of the feared animal. Therefore, in order to control for the effects of exposure to the dog per se, a third group of children was presented the series of parties in the presence of the dog with the model absent. A fourth group participated in the positive activities but was never exposed to either the dog or the modeled displays.

Following the completion of the treatment series, the children were readministered, by a different experimenter, the situational test consisting of the graded sequence of interaction tasks with the test animal. They were asked, for example, to approach and to pet the dog, to release her from a play pen, to remove her leash, to feed her dog biscuits, and to spend a fixed period of time alone in the room with the animal while the experimenter departed to fetch an additional supply of canine cookies. The terminal test items required the children to climb into the play pen with the dog, to pet, and to remain alone with the animal under the exceedingly confining and potentially fear-provoking conditions.

In order to determine the generality of vicarious extinction effects, half the children in each of the four groups were tested initially with the experimental animal and then with an unfamiliar dog; the remaining children were presented the two dogs in the reversed order. In addition, the assessment procedures were repeated approximately one month later so as to assess the stability of the modeling-induced changes.

The modeling procedure produced highly stable and generalized vicarious extinction of avoidance responses. This is shown in the fact that the two groups of children, who had observed the peer model interact nonanxiously with the dog, displayed significantly greater approach behavior toward both the experimental and the unfamiliar animals than children in the exposure and control conditions, which did not differ from each other. The positive context, however, did not contribute any significant variance to the obtained outcomes. As might be expected, the positive context and repeated assessments also produced some decrease in avoidance behavior.

If symbolic modeling procedures, utilizing pictorial stimuli, should also prove efficacious in extinguishing conditioned emotional responses, then carefully programmed therapeutic films could be developed for pre-

ventive programs designed to eliminate common fears and anxieties before they become well established and widely generalized.

V. Concluding Remarks

Both the early and more recent conceptualizations of vicarious or observational learning have been developed and tested largely on the basis of a limited paradigm requiring observing subjects to perform matching responses as a precondition for their acquisition. A considerably more prevalent and significant vicarious phenomenon is evident in the occurrence of delayed reproduction of modeling behavior originally learned by observers under a nonresponse acquisition procedure.

The present paper is mainly concerned with the theoretical analysis of the process of no-trial learning. Unlike most previous accounts of modeling effects, which tend to highlight the reinforcing stimulus control of matching responses, the theory propounded by the author emphasizes the function of representational processes in observational learning. According to this formulation, matching responses are acquired on the basis of stimulus contiguity and are mediated by cue-producing symbolic responses which exercise discriminative stimulus control over corresponding overt performances. Thus, in this mode of response acquisition, imaginal and verbal representations of modeling stimuli constitute the enduring learning products of observational experiences. While the perceptual and cognitive aspects of vicarious learning are given emphasis, it is recognized that motivational and reinforcement variables may influence indirectly the level of *response acquisition* by augmenting or reducing the occurrence of requisite observing responses and facilitative covert rehearsal. There is considerable research evidence, however, that the *performance* of previously learned matching responses is primarily governed by reinforcement-related variables.

The theory advanced in this paper suggests that vicarious learning may be analyzed in the same manner as other associative learning processes. In the formation of novel responses, new associative connections between existing behavioral elements are established through observation. Since the observer does not engage in overt performances during the acquisition stage, the new integrations involve representational responses elicited by the modeling stimuli. In addition, the observer learns the sequential connections between modeling responses as they are exhibited in a continuous chain.

The fact that vicarious learning experiments employ social cues rather than nonsense syllables does not result in an acquisition process that is fundamentally different from traditional associative learning. There is no reason to believe, for example, that the principles governing the

integration of elements in the mechanically displayed syllables Z XK, the modeled verbalization *supercalifragilisticexpialidocious*, or a modeled aggressive response consisting of several distinct components are essentially different simply because the former stimuli are presented to the observer in a nonsocial memory drum, whereas the latter stimuli are displayed socially. Nor are basically different learning processes involved in the acquisition of the clearly unique verbal response *supercalifragilisticexpialidocious* when presented in the aperture of a memory drum or by a verbalizing model. Consequently, there is no need to search for enigmatic, psychological mechanisms and elusive, dynamic variables in accounting for learning by observation, imitation, or identification.

The study of the social transmission of response patterns is necessitated by the fact that the behavioral repertoires which constitute an enduring part of a culture are to a large extent transmitted on the basis of repeated observation of behavior displayed by social models rather than by memory drums. While the learning process is essentially the same, the characteristics of the social transmitters and other interpersonal variables can greatly affect the rate, level, and types of responses that will be acquired observationally. Moreover, the efficacy of parameters established on the basis of learning in one-person situations may differ in dyadic and group situations (Bandura *et al.*, 1963b). A comprehensive theory of behavior must therefore be based on experimentation involving both social and learning variables.

In addition to response learning, witnessing the reinforcement contingencies of a model is often highly influential in modifying the extent to which similar existing patterns of social behavior will later be exhibited by observers. The strength of inhibitory responses may likewise be significantly altered, and emotional responses may be vicariously conditioned and extinguished as a function of observing the reinforcing consequences to a model and his attendant affective reactions. The research findings reviewed in this chapter identify some of the social-learning variables determining the diverse behavioral effects on observers of exposure to socially modeled stimulus events.

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