# *Analysis of Modeling Processes*

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Among the numerous topics that have attracted the interest of psychologists over the years, the phenomenon of learning has occupied a central position. Most of the research in this area examines the process of learning as a consequence of direct experience: This volume is principally concerned with learning by example.

It is evident from informal observation that human behavior is transmitted, whether deliberately or inadvertently, largely through exposure to social models. Indeed, as Reichard (1938) noted some years ago, in many languages "the word for 'teach' is the same as the word for 'show'." It is difficult to imagine a culture in which language, mores, vocational activities, familial cus-

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toms, and educational, religious, and political practices are gradually shaped in each new member by direct consequences of their trial-and-error performances without benefit of models who display the cultural patterns in their behavior.

Although much social learning is fostered through observation of real-life models, advances in communication have increased reliance upon symbolic models. In many instances people pattern their behavior after models presented in verbal or pictorial form. Without the guidance of handbooks that describe in detail how to behave in particular situations, members of technologically advanced societies would spend much of their time groping for effective ways of handling situations that arise repeatedly. Pictorially presented models, provided in television and other filmed displays, also serve as influential sources of social behavior.

Considering the prevailing influence of example in the development and regulation of human behavior, it is surprising that traditional accounts of learning contain little or no mention of modeling processes. If the peripatetic Martian were to scrutinize earth man's authoritative texts on learning he would be left with the belief that there are two basic modes of learning: People are either conditioned through reward and punishment to adopt the desired patterns, or emotional responsiveness is established by close association of neutral and evocative stimuli. If these methods alone were applied on the distant planet, the life span of Martians would not only be drastically shortened, but their brief period of survival would be expended in prolonged and laborious efforts to master simple skills.

The marked discrepancy between textbook and social reality is largely attributable to the fact that certain critical conditions present in natural situations are rarely, if ever, reproduced in laboratory studies of learning. In laboratory investigations experimenters arrange comparatively benign environments in which errors do not create fatal consequences for the organism. By contrast, natural environments are loaded with potentially lethal consequences for those unfortunate enough to perform hazardous errors. For this reason it would be exceedingly injudicious to



rely on differential reinforcement of trial-and-error performances in teaching children to swim, adolescents to drive automobiles, medical students to conduct surgical operations, or adults to develop complex occupational and social competencies. Had experimental situations been made more realistic so that animals toiling in Skinner boxes and various mazes were drowned, electrocuted, dismembered, or extensively bruised for the errors that invariably occur during early phases of unguided learning, the limitations of instrumental conditioning would have been forcefully revealed.

There are several reasons why modeling influences are heavily favored in promoting everyday learning. Under circumstances in which mistakes are costly or dangerous, skillful performances can be established without needless errors by providing competent models who demonstrate the required activities. Some complex behaviors can be produced solely through the influence of models. If children had no opportunity to hear speech it would be virtually impossible to teach them the linguistic skills that constitute a language. It is doubtful whether one could ever shape individual words by selective reinforcement of random vocalizations, let alone grammatical utterances. Where desired forms of behavior can be conveyed only by social cues, modeling is an indispensable aspect of learning. Even in instances where it is possible to establish new response patterns through other means, the process of acquisition can be considerably shortened by providing appropriate models (Bandura & McDonald, 1963; John, Chesler, Bartlett, & Victor, 1968; Luchins & Luchins, 1966).

## Differentiation of Modeling Phenomena

Modeling phenomena have been differentiated, and much time has been spent in conflict over the criteria used in these arbitrary classifications. Among the diverse terms applied to matching behavior are "imitation," "modeling," "observational learning," "identification," "internalization," "introjection," "incorporation," "copying," "social facilitation," "contagion," and "role-taking."

In theoretical discussions imitation is most frequently differentiated from identification on the basis of the content of the changes resulting from exposure to modeling influences. Imitation is generally defined as the reproduction of discrete responses, but there is little agreement concerning the use of the term identification. Different writers have ascribed to identification the adoption of either diverse patterns of behavior (Kohlberg, 1963; Parsons, 1955; Stoke, 1950), symbolic representation of the model (Emmerich, 1959), similar meaning systems (Lazowick, 1955), or motives, values, ideals, and conscience (Gewirtz & Stingle, 1968).

Distinctions are sometimes made in terms of the conditions assumed to produce and maintain matching behavior, as illustrated by Parsons's (1951) view that "a generalized cathectic attachment" is required for identification, but is unnecessary in imitation. Kohlberg (1963) differs in reserving the term identification for matching behavior that is presumed to be maintained by intrinsic satisfactions derived from perceived similarity, and applying the label imitation to instrumental matching responses supported by extrinsic rewards. Others define imitation as matching behavior occurring in the presence of the model, and identification as performance of the model's behavior in his absence (Kohlberg, 1963; Mowrer, 1950). Not only is there little consensus with respect to differentiating criteria, but some theorists assume that imitation produces identification, while others contend with equally strong conviction that identification results in imitation.

Unless it can be shown that modeling of different forms of behavior is governed by separate determinants, distinctions proposed in terms of the content of what is emulated not only are gratuitous, but may cause needless confusion. Limited progress would be made in understanding learning processes if fundamentally different mechanisms were invoked, without empirical justification, to account for the acquisition of one social response versus ten social responses that are arbitrarily designated as elements of a role. Results of numerous studies reviewed in detail elsewhere (Bandura, 1969a) reveal that the same determinants influence acquisition of isolated matching responses and of entire behavioral repertoires in identical ways. Moreover, retention and delayed reproduction of even discrete matching responses require symbolic representation of previously modeled events, especially in early stages of learning. There is also little reason to suppose on empirical or on theoretical grounds that the principles and processes involved in the acquisition of modeled behaviors later performed in the presence of models are different from those performed in their absence.



Several experiments (Bandura, Blanchard & Ritter, 1969; Blanchard, 1970; Perloff, 1970) have demonstrated that exposure to the same modeling influence simultaneously produces in observers analogous changes in specific behavior, emotional responsiveness, valuation of objects involved in the modeled activities, and in self-evaluation. It may be questioned whether any conceptual benefits accrue from arbitrarily designating some of these changes as identification and others as imitation. Indeed, if the diverse criteria enumerated above were seriously applied either singly or in various combinations in categorizing modeling outcomes, most instances of matching behavior that have been traditionally labeled imitation would also qualify as identification, and much of the behavior cited as identificatory learning would be reclassified as imitation.

In social learning theory (Bandura, 1969a) the phenomena ordinarily subsumed under the labels imitation and identification are designated as *modeling*. The latter term was adopted because modeling influences have much broader psychological effects than the simple response mimicry implied by the term imitation, and the distinguishing properties of identification are too diffuse, arbitrary, and empirically questionable either to clarify issues or to aid scientific inquiry. Research conducted within this framework has shown that modeling influences can produce three separable types of effects depending on the different processes involved. First, observers can acquire new patterns of behavior by watching the performances of others. This *observational learning effect* is demonstrated most clearly when models exhibit novel responses which observers have not yet learned to make and which they later reproduce in substantially identical form.

A second major function of modeling influences is to strengthen or to weaken inhibition of previously learned responses. The effects that modeled activities have on behavioral restraints are largely determined by observation of rewarding and punishing consequences accompanying the actions. *Inhibitory effects* are indicated when observers show either decrements in the modeled class of behavior or a general reduction of responsiveness as a result of seeing the model's behavior produce punishing consequences. Observed punishment has been shown to reduce exploratory behavior (Crooks, 1967), aggression (Bandura, 1965b; Wheeler, 1966), and transgressive behavior (Walters & Parke, 1964; Walters, Parke & Cane, 1965). Comparable reductions in performance are obtained in observers when models respond self-punitively to their own behavior (Bandura, 1971a; Benton, 1967).

*Disinhibitory effects* are evident when observers increase performance of formerly inhibited behavior after observing models engage in threatening or prohibited activities without adverse consequences. This type of change is most strikingly illustrated in the treatment of phobic conditions through modeling procedures (Bandura, 1971b). People who strongly inhibit even attenuated approach responses toward objects they fear are able to interact closely with them after observing bold performers engaging in threatening activities without experiencing any untoward consequences.

The behavior of others can also serve as cues in facilitating performance of existing responses in the same general class. People applaud when others clap; they look up when they see others gazing skyward; they adopt fads that others display; and in countless other situations their behavior is prompted and channeled by the actions of others. *Response facilitation effects* are



distinguished from observational learning and disinhibition because no new responses are acquired, and disinhibitory processes are not involved because the behavior in question is socially sanctioned and hence is unemcumbered by restraints.

## Explanatory Theories

Some of the major controversies in the explanation of modeling phenomena can best be illustrated by tracing the evolution of theories of imitation. Disputes between theoretical positions often arise from failure to distinguish the diverse effects that modeling influences can have. Since different conditions are required to produce observational learning, modification of behavioral restraints, and social facilitation, a theory proposed to explain learning by observation will necessarily differ from one that is principally concerned with social facilitation. A number of other important issues that are raised by current theorizing and research will be discussed later.

### *Instinctual Interpretations*

The earliest explanations of imitation (Morgan, 1896; Tarde, 1903; and McDougall, 1908) regarded modeling as instinctual: People reproduce the behavior of others because they have an innate propensity to do so. As the practice of attributing human behavior to instinctual forces gained widespread acceptance, psychologists became increasingly critical of the explanatory value of the instinct concept. Subsequent theories assumed that imitativeness is acquired through some type of learning mechanism, though they differed as to what is learned and the factors considered essential for imitation to occur.

### *Associative Theories*

After the instinct doctrine fell into disrepute, a number of psychologists, notably Humphrey (1921), Allport (1924), Holt

(1931), and Guthrie (1952), portrayed modeling in terms of associative principles. As Guthrie succinctly stated, "If we have performed an act, the stimuli associated with that act tend to become cues for its performance (p. 287)." Associative learning was believed to be achieved most rapidly through initial reverse imitation. According to Holt's conceptualization, when an adult copies the response of a child, the latter tends to repeat the reiterated behavior. As this circular associative sequence continues, the adult's behavior becomes an increasingly effective stimulus for the child's responses. If during this spontaneous mutual imitation the adult performs a response that is novel for the child, he will copy it. Piaget (1952) likewise cited imitations at early stages of development in which the child's spontaneous behaviors serve initially as stimuli for matching responses by the model in alternating imitative sequences. Allport believed that imitativeness develops through classical conditioning of verbalizations, motor responses, or emotions to similar classes of social stimuli with which they have been contiguously associated.

The associative theories explained how previously learned behavior might be elicited by the actions of others. But the principle of association does not adequately account for the fact that behavior is controlled by some social stimuli, but not by others that have been associated with equal frequency. A more serious limitation is the failure of these formulations to explain how novel responses are learned to begin with. Observational learning in humans and animals does not ordinarily commence by having a model reproduce irrelevant responses of the learner. In using modeling procedures to teach a myna bird to talk, for example, the trainer does not engage initially in circular crowing behavior; he begins by uttering words he wishes to teach that clearly do not exist in integrated form in the bird's vocal repertoire.

## *Reinforcement Theories*

With the advent of reinforcement principles, the emphasis in learning theory shifted from classical conditioning to instrumental conditioning based on reinforcing consequences. Theories of modeling similarly assumed that observational learning occurred through reinforcement of imitative behavior. Learning was still conceptualized in terms of the formation of associations between social stimuli and matching responses, but reinforcement was added as the selective factor determining which of the many responses displayed by others will be imitated.

The foremost proponents of behaviorism, Watson (1908) and Thorndike (1898), dismissed the existence of observational learning on the basis of disappointing results from a few animals tested under conditions in which observation of the demonstrator's performance was not adequately controlled. Since the theories in vogue at the time assumed that learning required performance of responses, the notion of learning by observation alone was perhaps too divergent to be given serious consideration.

There was no research to speak of on modeling processes until the publication of the classic *Social Learning and Imitation* by Miller and Dollard in 1941. They advanced the view that in order for imitative learning to occur, observers must be motivated to act, modeling cues for the requisite behavior must be provided, observers must perform matching responses, and they must be positively reinforced. It was further assumed that if imitative behavior is repeatedly rewarded, imitation itself becomes a secondary drive presumably reduced by acting like the model.

The experiments conducted by Miller and Dollard demonstrated that when subjects are consistently rewarded for imitating the choice responses of a model in two-choice discrimination problems, they show a marked increase in imitativeness, but cease imitating the model if they are never rewarded for making the same choices. Moreover, subjects generalize copying responses to new models and to different motivational states. No attempt was made, however, to test whether imitation functions as a drive, which presumably should be altered in strength by deprivation or satiation of matching behavior.

These experiments have been widely accepted as demonstrations of imitative learning although they actually represent only a special form of discrimination place-learning in which social rather than environmental cues serve as stimuli for choice responses that already exist in the subject's behavioral repertoire. Indeed, had a light or some other distinctive cue been used to signify the outcomes of choices, the behavior of models would have been irrelevant, perhaps even a hindrance, to efficient performance. By contrast, most forms of imitation involve *response* rather than *place-learning,* in which observers organize behavioral elements into new compound responses solely by observing modeled performances. Since Miller and Dollard's theory requires a person to perform imitative responses before he can learn them, it accounts more adequately for the expression of previously established matching responses than for their acquisition. It is perhaps for this reason that the publication of *Social Learning and Imitation,* which contained many provocative ideas, stimulated little new research, and modeling processes continued to be treated in a cursory fashion or ignored entirely in accounts of learning.

The operant conditioning analysis of modeling phenomena (Baer & Sherman, 1964; Skinner, 1953), which also specifies reinforcement as a necessary condition, relies entirely upon the standard three-component paradigm $S^d \rightarrow R \rightarrow R^r$, where $S^d$ denotes the modeled stimulus, $R$ represents an overt matching response, and $S^r$ designates the reinforcing stimulus. Except for deletion of the motivational requirement, the Skinnerian interpretation contains the same necessary conditions for imitation (that is, cue, response, reinforcement) originally proposed by Miller and Dollard. Observational learning is presumed to be achieved through a process of differential reinforcement. When imitative behavior has been positively reinforced and divergent responses either not rewarded or punished, the behavior of others comes to function as discriminative stimuli for matching responses.

It is difficult to see how this scheme applies to the observational learning that takes place without overt performance of the model's responses during the acquisition phase, without reinforcers administered to the model or to the observer, and in which the first appearance of the acquired response may be delayed for



days, weeks, or even months. In the latter case, which represents one of the most prevalent forms of social learning, two of the events ($R \rightarrow S^r$) in the three-term paradigm are absent during acquisition, and the third element ($S^d$, or modeling stimulus) is typically absent from the situation in which the observationally learned response is performed. Like the Miller and Dollard theory, the Skinnerian interpretation explains how performance of established matching responses is facilitated by social stimuli and reinforcing consequences. It does not adequately explain how a new matching response is acquired observationally in the first place. This occurs through symbolic processes during the period of exposure to modeling stimuli, prior to overt responding or the appearance of any reinforcing events.

In a recent operant conditioning analysis of generalized imitation, Gewirtz and Stingle (1968) conceptualized observational learning as analogous to the matching-to-sample paradigm used to study discrimination learning. In this procedure a subject chooses from among a number of comparison stimuli one that shares a common property with the sample stimulus. Although modeling and matching-to-sample performances both involve a matching process, they can hardly be equated. A person can achieve errorless choices in matching comparison Italian and Wagnerian operatic arias with a sample Wagnerian recital, but remain totally unable to perform the vocal behavior contained in the sample. Accurate stimulus discrimination is merely a precondition for observational response learning.

In reducing observational learning to operant conditioning, Gewirtz usually cites examples in which models simply facilitate previously learned responses. However, the purpose of a theory of observational learning is not to account for social facilitation of established responses, but to explain how observers can acquire a novel response that they have never made before as a result of observing a model. Gewirtz argues that since the entire past learning history of an observer is not known, one cannot prove the negative: that a given response had not been learned prior to the modeling experience. That people can learn by observation can be readily demonstrated without controlling or cataloguing the entire life history of the observer. One need only model an original response, such as the word *zoognick*—never before encountered because it was just created—and test whether observers acquire it. Other forms of learning, including operant conditioning, also are studied by using novel responses rather than by assessing past performances which would require monitoring every action that an organism has ever made both within and outside the experimental situation. Gewirtz's position with regard to observational learning is somewhat indeterminate because he alternately questions whether the phenomenon exists, reduces it to social facilitation of learned responses, and offers new descriptive labels (for example, "generalized imitation," "learn-to-learn," and "discriminated-operant") as explanations. To say that people learn by observation because they have "learned-to-learn," or because they have acquired a "complex discriminated-operant" in no way explains how responses are organized to form new observed patterns without reinforced performance.

## *Affective-Feedback Theories*

Mowrer (1960) developed a sensory-feedback theory of imitation that emphasizes classical conditioning of positive and negative emotions evoked by reinforcement to stimuli arising from matching behavior. He distinguishes two forms of imitative learning in terms of whether the observer is reinforced directly or vicariously. In the first case, the model performs a response and at the same time rewards the observer. Through repeated contiguous association of the model's behavior with rewarding experiences, his responses eventually take on positive value for the observer. Through stimulus generalization, the observer can later produce self-rewarding experiences simply by performing the model's positively valenced behavior.

In the second "empathetic" form of imitative learning, the model not only exhibits the response, but also experiences the



reinforcing consequences. It is assumed that the observer experiences the sensory concomitants of the model's behavior empathetically and intuits his satisfactions or discomforts. As a result of this empathetic conditioning, the observer is predisposed to reproduce the matching responses for the attendant positive sensory feedback.

There is substantial evidence (Bandura & Huston, 1961; Grusec, 1966; Henker, 1964; Mischel & Grusec, 1966; Mussen & Parker, 1965) that modeling can be augmented by increasing the positive qualities of a model or by having the observer witness the model being rewarded. These same studies, however, contain some contradictory findings with regard to the affective conditioning theory. Even though a model's rewarding qualities are equally associated with the different types of behaviors he performs, modeling affects tend to be specific rather than general. That is, model nurturance enhances imitation of some responses, has no effect upon others, and may actually diminish the adoption of still others (Bandura, Grusec, & Menlove, 1967a). A preliminary study by Foss (1964), in which mynas were taught unusual whistles played on a tape recorder, also failed to confirm the proposition that modeling is enhanced through positive conditioning. Sounds were imitated to the same extent regardless of whether they were presented alone or played only when the birds were being fed.

Mowrer's analysis of imitation is principally concerned with how modeled responses can be invested with positive or negative emotional qualities. Modeling theory, on the other hand, is more often called upon to explain the mechanics of acquisition of patterned behavior observationally rather than its emotional concomitants. A comprehensive theory must therefore elucidate how new patterns of behavior are constructed and the processes governing their execution.

In an elaboration of the affective-feedback theory of imitation, Aronfreed (1969) advanced the view that pleasurable and aversive affective states become conditioned to both response-produced stimuli and cognitive templates of modeled actions.

Imitative performances are presumed to be controlled by affective feedback from intentions as well as from proprioceptive cues generated during an overt act. This conceptualization of imitation is difficult to verify empirically because it does not specify in sufficient detail the characteristics of templates, the process whereby cognitive templates are acquired, the manner in which affective valences become coupled to templates, and how the emotion-arousing properties of templates are transferred to intentions and to proprioceptive cues intrinsic to overt responses. There is some experimental evidence, however, that has important implications for the basic assumptions contained in the notion of feedback.

Feedback theories, particularly those that attribute controlling functions to proprioceptive cues, are seriously challenged by the findings of curare-conditioning experiments in which animals are skeletally immobilized by the drug during aversive conditioning or extinction. These studies (Black, 1958; Black, Carlson, & Solomon, 1962; Solomon & Turner, 1962) demonstrate that learning can occur in the absence of skeletal responding and its correlated proprioceptive feedback. Results of deafferentation studies (Taub, Bacon, & Berman, 1965; Taub et al., 1966) also show that responses can be acquired, performed discriminatively, and extinguished with sensory somatic feedback surgically abolished by limb deafferentation. It would seem from these findings that the acquisition, integration, facilitation and inhibition of responses can be achieved through central mechanisms independent of peripheral sensory feedback.

It is also evident that rapid selection of responses from among a varied array of alternatives cannot be governed by sensory feedback since relatively few responses could be activated even incipiently during the brief time that people usually have to decide how to respond to the situations confronting them (Miller, 1964). Recognizing this problem, Mowrer (1960) has conjectured that the initial scanning and selection of responses occurs primarily at the cognitive rather than at the action level. Consistent with this view, in the social learning analysis of self-regulatory systems (Bandura, 1971a; 1971c) human behavior is largely controlled by anticipated consequences of prospective actions.



Human functioning would be exceedingly inflexible and unadaptive if responsiveness were controlled by affectivity in the behavior itself. Considering the highly discriminative character of social responsiveness, it is extremely doubtful that actions are regulated by affective qualities implanted in behavior. Aggression will serve as an example.

Hitting responses directed toward parents, peers, and inanimate objects differ little, if at all. Nevertheless, hitting parents is generally strongly inhibited, whereas physical aggression toward peers is freely expressed (Bandura, 1960; Bandura & Walters, 1959). Moreover, in certain well-defined contexts, particularly in competitive physical contact sports such as boxing, people will readily display vigorous physical aggression. One can more accurately predict the expression or inhibition of identical aggressive responses from knowledge of the social context (church or athletic gymnasium), the target (parent, priest, policeman, or peer), and other cues that reliably signify potential consequences, than from assessment of the affective value of aggressive behavior per se. It has been amply demonstrated (Bandura, 1971a) that selection and performance of matching responses is mainly governed by anticipated outcomes based on previous consequences that were either directly encountered, vicariously experienced, or self-administered. In other words, responses are chosen from available alternatives more often on the basis of their functional than their emotional value.

Affective feedback conceptions of modeling also fail to account for matching behavior when neither the model nor the observer is reinforced. In these instances, the theory can be preserved only by attributing inherent emotional properties to the behavior that may not always be warranted. In fact, a vast majority of the responses that are acquired observationally are not affectively valenced. This is exemplified by studies of observational learning of mechanical assembly tasks from filmed demonstrations that do not contain stimuli that would arouse the emotion essential for affective conditioning (Sheffield & Maccoby, 1961). Mowrer has, of course, pointed out that sensory experiences can also produce conditioned sensations or images. In most cases of observational learning imaginal or other symbolic representations of modeling stimuli may be the only important mediating processes. Sensory-feedback theories of imitation may therefore be primarily applicable to instances in which modeled responses incur relatively potent consequences so that observers come to anticipate similar emotional consequences if they were to imitate the behavior. Affective conditioning should therefore be regarded as a facilitative rather than a necessary condition for modeling.

## *Social Learning Theory*

Most contemporary interpretations of learning assign a more prominent role to cognitive functioning in the acquisition and regulation of human behavior than did previous explanatory systems. Social learning theory (Bandura, 1969a; 1971c) assumes that modeling influences operate principally through their informative function, and that observers acquire mainly symbolic representations of modeled events rather than specific stimulus-response associations. In this formulation, modeling phenomena are governed by four interrelated subprocesses. These four subsystems are briefly discussed in the sections that follow.

### ATTENTIONAL PROCESSES

One of the main component functions in observational learning involves attentional processes. Simply exposing persons to modeled responses does not in itself guarantee that they will attend closely to them, select from the total stimulus complex the most relevant events, and perceive accurately the cues to which their attention has been directed. An observer will fail to acquire matching behavior at the sensory registration level if he does not attend to, recognize, and differentiate the distinctive features of



the model's responses. Discriminative observation is therefore one of the requisite conditions for observational learning.

A number of attention-controlling variables can be influential in determining which models are closely observed and which are ignored. The incentives provided for learning modeled behavior, the motivational and psychological characteristics of the observer, and the physical and acquired distinctiveness of the model as well as his power and interpersonal attractiveness are some of the many factors that exert selective control over the attention people pay to the variety of modeled activities they encounter in their everyday life. The people with whom one regularly associates delimit the types of behavior that one will repeatedly observe and hence learn most thoroughly.

### RETENTION PROCESSES

A second basic component function in observational learning that has been virtually ignored in theories of imitation is the retention of modeled events. When a person observes a model's behavior without performing the responses, he can acquire the modeled responses while they are occurring only in representational form. In order to reproduce this behavior without the continued presence of external modeling cues, he must retain the original observational inputs in some symbolic form. This is a particularly interesting problem in the instance of observationally acquired response patterns that are retained over extended periods, though rarely, if ever, activated into overt performance until attainment of an age or social status at which the activity is considered appropriate.

Observational learning involves two representational systems, the imaginal and the verbal. During exposure, modeling stimuli produce through a process of sensory conditioning relatively enduring, retrievable images of modeled sequences of behavior. Indeed, when stimulus events are highly correlated, as when a name is consistently associated with a given person, it is virtually impossible to hear the name without experiencing imagery of the person's physical characteristics. Similarly, reference to activities (for example, golfing or surfing), places (San Francisco, New York, Paris), and things (the Washington Monument, an airliner) that one has previously observed immediately elicits vivid imaginal representations of the absent physical stimuli.

The second representational system, which probably accounts for the notable speed of observational learning and long-term retention of modeled contents by humans, involves verbal coding of observed events. Most of the cognitive processes that regulate behavior are primarily verbal rather than visual. To take a simple example, the route traversed by a model can be acquired, retained, and later reproduced more accurately by verbal coding of the visual information into a sequence of right-left turns (RRLRR) than by reliance upon visual imagery of the itinerary. Observational learning and retention are facilitated by such codes because they carry a great deal of information in an easily stored form. After modeled responses have been transformed into images and readily utilizable verbal symbols, these memory codes serve as guides for subsequent reproduction of matching responses.

The influential role of symbolic representation in observational learning is supported in several studies differing in age of subjects and in content of modeled activities. In one experiment (Bandura, Grusec, & Menlove, 1966) children observed several complex sequences of behavior modeled on film. During exposure the children either watched attentively, coded the novel responses into their verbal equivalents as they were performed by the model, or counted rapidly while watching the film to prevent implicit verbal coding of modeling stimuli. A subsequent test of observational learning disclosed that children who verbally coded the modeled patterns reproduced significantly more matching responses than those in the viewing-along condition, who in turn showed a higher level of acquisition than children who engaged in competing symbolization. Children within the verbalizing condition reproduced a high proportion (60%) of the modeled responses that they had coded into words, whereas



they retrieved a low proportion (25%) of the responses they failed to code.

Coates and Hartup (1969) investigated developmental changes in the role of verbal coding of modeling stimuli in observational learning within the context of the production deficiency hypothesis. According to this hypothesis, which was originally proposed by Keeney,Cannizzo and Flavell (1967), young children are capable of but do not utilize symbolic activities that would facilitate performance, whereas older children spontaneously produce and employ verbal mediators, and therefore do not benefit from further prompts to engage in symbolic activities. Consistent with this view, Coates and Hartup found that induced verbal labeling of modeling stimuli enhanced observational learning in young children but had no effect on older subjects. The issue requires further study in view of further evidence that induced verbal coding can facilitate observational learning in both older children (Bandura, Grusec & Menlove, 1966) and adults (Bandura & Jeffery, 1971; Gerst, 1971). Moreover, van Hekken (1969) found that it was the older children who spontaneously used symbolic skills in other learning tasks rather than the "nonmediators" who achieved increases in observational learning through induced verbal coding of modeling stimuli.

Additional evidence for the influence of symbolic coding operations in the acquisition and retention of modeled responses is furnished by Gerst (1971). College students observed a filmed model perform complex motor responses composed of intricate movements taken from the alphabet of the deaf. Immediately after observing each modeled response, subjects engaged in one of four symbolic activities for a period of one minute. One group reinstated the response through vivid imagery; a second group coded the modeling stimuli into concrete verbal terms by describing the specific response elements and their movements; the third group generated concise labels that incorporated the essential ingredients of the responses. (For example, a pretzel-shaped response might be labeled as an orchestra conductor moving his baton in a symphonic finale.) Subjects assigned to the control group performed mental calculations to impede symbolic coding of the depicted events. The subjects reproduced the modeled responses immediately after coding, and following a 15-minute period during which they performed a distracting task designed to prevent symbolic rehearsal of modeled responses.

All three coding operations enhanced observational learning. Concise labeling and imaginal codes were equally effective in aiding immediate reproduction of modeled responses, both being superior to the concrete verbal form. The delayed test for retention of matching responses showed concise labeling to be the best coding system for memory representation. Subjects in this condition retained significantly more matching responses than those who relied upon imagery and concrete verbalizations.

The relative superiority of the summary labeling code is shown even more clearly when matching performances are scored according to a stringent criterion requiring that all response elements be reproduced in the exact sequence in which they were originally modeled. Subjects who coded the modeling stimuli with concise labels were able to reproduce approximately twice as many well-integrated responses in the retention test as the other groups. Moreover, modeled responses for which subjects retained the summary codes were reproduced at a higher level of accuracy (52%), than those for which the code was lost (7%).

In a recent paper, Gewirtz and Stingle (1968) questioned the value of theories of modeling that include symbolic processes on the grounds that the symbolic events are inferred from the matching behavior they are designed to explain. This type of criticism might apply to theories that attribute behavior to hypothetical internal agencies having only a tenuous relationship to antecedent events and to the behavior that they supposedly explain. In the experiments cited here, symbolic events are independently manipulated and not simply inferred from matching behavior.

Before discussing other factors that facilitate retention of symbolically modeled contents, the structural characteristics of representation should be clarified. Internal representations are not necessarily exact replicas of external modeling stimuli. Indeed, the changes that could be produced through modeling influences would be limited if coded representations were always structurally isomorphic to individual responses performed by others. Relevant evidence will be cited later to show that observers often abstract common features from a variety of modeled responses and construct higher-order codes that have wide generality. Moreover, results reported by Gerst (1971) indicate that modeled behavior is most effectively acquired and retained when modeled configurations are likened to events that are familiar and meaningful to the observer. These findings accord with the common observation that learning through modeling is often enhanced when required performances are represented as resembling familiar activities. The members of a ski class that could not learn to transfer their weight to the downhill ski despite several demonstrations by the instructor were observed to promptly master the maneuver when asked to ski as though they were pointing a serving tray downhill throughout the turns and traverses.



In social learning theory observers function as active agents who transform, classify, and organize modeling stimuli into easily remembered schemes rather than as quiescent cameras or tape recorders that simply store isomorphic representations of modeled events.

Another means of stabilizing and strengthening acquired responses is rehearsal operations. The level of observational learning can be considerably enhanced through practice or overt rehearsal of modeled response sequences, particularly if the rehearsal is interposed after natural segments of a larger modeled pattern. Of greater import is evidence that covert rehearsal, which can be readily engaged in when overt participation is either impeded or impracticable, may likewise increase retention of acquired matching behavior (Bandura & Jeffery, 1971; Michael & Maccoby, 1961). Like coding, rehearsal involves active processes.

There is reason to believe that the benefits accruing from rehearsal result from an individual's reorganization and recoding of input events rather than from sheer repetition.

### MOTORIC REPRODUCTION PROCESSES

The third major component of modeling phenomena is concerned with motoric reproduction processes. This involves the utilization of symbolic representations of modeled patterns to guide overt performances. The process of representational guidance is similar to response execution under conditions in which a person follows an externally depicted pattern, or is directed through a series of instructions to enact novel response sequences. The only difference is that a directed performance is guided by external cues, whereas in delayed modeling, behavioral reproduction is monitored by symbolic counterparts of absent stimuli.

The rate and level of observational learning will be partly governed, at the motoric level, by the availability of essential component responses. Complex modes of behavior are produced by combinations of previously learned components which may in themselves be relatively complicated compounds. In instances where observers lack some of the necessary components, the constituent elements may be modeled first; then in stepwise fashion, increasingly intricate compounds can be developed imitatively.

### REINFORCEMENT AND MOTIVATIONAL PROCESSES

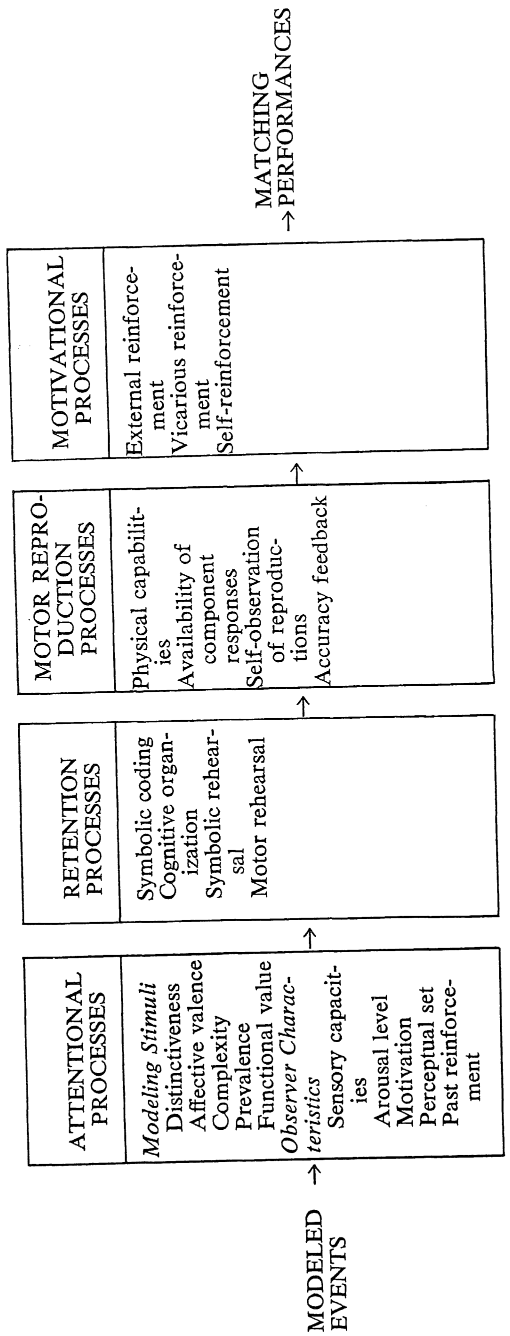
The final component function concerns motivational or reinforcement processes. A person may acquire and retain the capability of skillful execution of modeled behavior, but the learning will rarely be activated into overt performance if negative sanctions or unfavorable incentive conditions obtain. In such circumstances, the introduction of positive incentives promptly translates observational learning into action (Bandura, 1965b). Reinforcement variables not only regulate the overt expression of



matching behavior, but they can also affect observational learning by exerting selective control over the types of modeled events to which people are most likely to attend. Further, they facilitate selective retention by activating deliberate coding and rehearsal of modeled behaviors that have functional value. These and other issues bearing on the role of reinforcement in modeling are discussed more fully in subsequent sections.

If one is merely interested in producing imitative behavior, some of the subprocesses outlined above can be disregarded. A model who repeatedly demonstrates desired responses, instructs others to reproduce them, manually prompts the behavior when it fails to occur, and offers valued rewards for correct imitations, will eventually elicit matching responses in most people. It may require 1, 10, or 100 demonstration trials, but if one persists, the desired behavior will eventually be evoked. If, on the other hand, one wishes to explain the conditions governing modeling phenomena, a diverse set of controlling variables must be considered. The critical subprocesses and their determinants are summarized in the following chart.

Theories of imitation that disregard cognitive functioning cannot adequately account for variations in matching performances that result from symbolic activities (Bandura & Jeffery, 1971; Gerst, 1971) when modeling stimuli and reinforcement contingencies remain the same for all subjects. Nor can such differences be attributed to prior history of reinforcement since there is no reason to believe that subjects randomly assigned to a symbolic coding condition have been more often rewarded for imitation than those not induced to code modeled events into words or images. The limitations of conceptual schemes that depict matching behavior as controlled solely by external stimuli and reinforcing consequences are also readily apparent in instances of repeated presentation of modeling stimuli under favorable reinforcement conditions that fail to produce matching responses. The difficulties encountered by Lovaas in creating imitative behavior in some autistic children have stimulated research




Subprocesses in the social learning view of observational learning.

on attentional deficits (Lovaas, Rehm & Schreibman, 1969). Preliminary findings indicate that autistic children have difficulty in processing information conveyed through different sensory modalities. However, their rate of learning is greatly facilitated by various attention-enhancing procedures (Wasserman, 1969) that would undoubtedly improve observational learning. Given evidence that observers often fail to remember what they have learned, nonmediational theories will eventually be forced to consider retention processes as well.

In any given instance, absence of appropriate matching behavior following exposure to modeling stimuli may result from failures in sensory registration of modeled events, inadequate coding of modeling stimuli for memory representation, retention decrements, motoric deficiencies, or unwillingness to perform matching behavior because of inadequate reinforcement. For these reasons theories which contend that people imitate because they have been intermittently reinforced for imitating in the past may have limited explanatory power.

Other theorists have proposed interpretations of imitation in which representational processes, in one form or another, figure prominently. In Sheffield's view (1961), matching performances are mediated by perceptual representations of modeled events, mainly in the form of visual imagery. These perceptual responses, or "blueprints," which serve as cues for overt action, are assumed to be conditioned solely through contiguous association with stimulus events.

This conceptualization and social learning have some points of similarity. Both positions postulate a representational guidance system for matching behavior which can be established without overt responding. But they differ in several important respects. In the social learning view, modeling stimuli serve more as sources of information than as automatic conditioners; observers often perform operations on modeling inputs so that transformational and organizational processes are involved as well as associational ones; less structural correspondence is assumed between memory codes and the original modeled patterns; verbal representation is assigned a greater response guidance function;

and reinforcement, which receives no mention in Sheffield's formulation, is treated in social learning as a factor that can facilitate observational learning.

## *Piaget's Theory*

Piaget (1951) presents a developmental account of imitation in which symbolic representation assumes an important function, especially in higher forms of modeling. At the earlier sensorimotor stages of development, imitative responding can be evoked only by having the model repeat the child's immediately preceding responses in alternating imitative sequences. During this period, according to Piaget, the child is unable to imitate responses that he has not previously performed spontaneously because actions cannot be assimilated unless they correspond to already existing schemas. Piaget reports that when models introduce new behavioral elements or even familiar responses that children have acquired but are not exhibiting at the moment, they do not respond imitatively. Imitation is thus restricted to reproduction of activities that children have already developed, that they can see themselves make, and that they have performed immediately before the model's reiteration.

If the above observations based on Piaget's longitudinal study of his own three children are replicable, then young children have weaker capabilities for observational learning than subhuman species. Animals (Adler & Adler, 1968) and birds (Foss, 1964) can learn new patterns of behavior observationally, and modeling stimuli can acquire the capacity to evoke existing matching responses even though the organism was not performing them beforehand. It is assumed by Piaget that during initial stages children do not distinguish between self-imitation and imitation of the actions of others. If this is the case, then the theory must explain why a child's own behavior can originally induce matching responses but identical actions initiated by others cannot.

In Piaget's view, schemas, which refer to schematic outlines of



activities, determine what behaviors can or cannot be imitated. Unfortunately, the descriptive account does not specify in any detail the extent to which schemas are learned or furnished innately and, if learned, the process whereby general features of an activity are abstracted from otherwise different instances. From the perspective of the multiprocess theory of modeling, deficiencies in imitative performance, which are typically attributed by Piaget to insufficiently differentiated schemas, may likewise result from inadequate observation of modeling stimuli, from motoric difficulties in executing learned patterns, or from faulty reinforcement. The latter factor deserves further comment because of its important bearing on evaluation of findings from naturalistic studies of modeling.

Observational data must be accepted with reservation when the model's reactions to the child's performances are not reported. Lovaas (1967) has shown that young children imitate precisely when they are rewarded only for exact matches, but if they are positively reinforced without regard to the quality of their reproduction, their imitations deteriorate rapidly. When only the child's responses are observed and recorded, imitative deficiencies arising from faulty reinforcement are likely to be erroneously attributed to his shortcomings. Since observational studies of the type conducted by Piaget involve a two-way influence process, imitative performances reflect not only the competency of the child but the reactions of the participating model to accurate and inadequate matches. If models respond alike to performances that differ widely in quality, children will tend to disregard modeling stimuli, whereas they reproduce accurately any activities within their capacity if models respond discriminately.

The discussion thus far has been concerned with early stages in the development of imitation as depicted by Piaget. As a child's intellectual development progresses, he becomes capable of delayed imitation of modeled events which he cannot see himself make. These changes presumably come about through coordination of visual and sensorimotor schemas, and differentiation of the child's own actions from those of others. He now begins systematic trial-and-error performance of responses until he achieves good matches to new modeled patterns.

At the final stages of development, which generally begin in the second year of life, children attain representative imitation. Schemas are coordinated internally to form new and complex patterns of modeled behavior without requiring overt provisional trials of actions. This covert imitation occurs through imaginal representation of modeled performances, which also serves as the basis for reproducing matching behavior when models are no longer present. Had Piaget extended his studies of imitation into later childhood years, it is likely that verbal representation would also have emerged as an important functional mediator in delayed modeling.

A comprehensive theory of modeling must explain not only how patterned behavior is acquired observationally, but also when and how frequently imitative behavior will be performed, the persons toward whom it will be expressed, and the social settings in which it is most likely to be exhibited. Piaget's account of imitation contains only a few passing remarks about the motivational factors regulating performance of matching behavior. Imitation is variously attributed to an intrinsic need for acting and knowing, to a desire to reproduce actions that differ partially from existing schemas, and to the esteem in which the model is held. Most researchers in the field of modeling would regard these factors as much too general to account satisfactorily for the highly discriminative character of imitative responding. In view of the abundant evidence that imitative performances can be strongly controlled by their external consequences, the influence of reinforcement variables must be considered in explanatory schemes, whatever their orientation may be.

## Controversial Issues in Modeling

Several controversial issues in the field of modeling were alluded to in the preceding review of theories formulated to ex-



plain imitative processes. In the present section the major points in dispute are discussed more fully. It should be noted here that since modeling depends on basic psychological subprocesses, such as attention, cognitive functioning, and retention, some of the issues are by no means unique to this phenomenon.

### *Criteria of Observational Learning*

There has been some debate concerning the criteria used for identifying the occurrence of observational learning. Learning may be reflected either in associational or in organizational changes in performance. In the former case, people learn to respond to certain situations in a particular way. As a result of correlated experiences existing forms of behavior are brought under the control of stimuli to which individuals previously did not respond at all, or reacted in a substantially different manner. They learn, for example, to stop at red signal lights, to avoid certain places and things with which they have had painful experiences, to perform activities that are encouraged and rewarded in particular settings, and to react emotionally to specific sounds and sights. Here learning is defined in terms of changes in stimulus control rather than in the characteristics of the behavior itself.

The second way in which learning is indexed, which has received much greater attention in modeling research, involves organization of response components into new forms of patterned behavior. To take a simple example: Persons can produce a variety of elementary sounds as part of their natural endowment. By combining existing sounds one can create a novel and exceedingly complex verbal response such as *supercalifragilistic-expialidocious.*

Some writers (Aronfreed, 1969; Patterson, Littman & Bricker, 1967) have questioned whether behavior formed through unique combinations of available elements represents learning since the components already exist in the subject's repertoire. According to this line of reasoning, a pianist who has mastered a Beethoven piano concerto has learned nothing new because all the finger movements already existed in his repertoire; and Beethoven cannot be credited with creating new symphonic music since he simply rearranged a few preexisting notes.

Response novelty is defined in terms of empirical criteria rather than a priori estimations. Any behavior that has an extremely low or zero probability of occurrence given appropriate stimulus conditions qualifies as a novel response. Most new compound responses are composed of common behavioral elements.

It was previously noted that modeling influences, depending on their nature, can have three quite different effects on observers. Disputes over observational learning sometimes result from failure to distinguish modeling experiments designed primarily to produce learning effects from those intended to elucidate inhibitory or social facilitation effects. Observational response learning is most convincingly demonstrated in studies employing specially constructed unique responses. It is extremely improbable, for example, that neologisms such as *lickitstickit* or *wetosmacko* (Bandura, Ross, & Ross, 1963a) would ever be uttered by subjects during an investigator's lifetime if these verbal responses were never modeled.

The establishment of new stimulus control of behavior through modeling is well illustrated by experiments in which observers learn to respond emotionally to previously neutral stimuli as a result of seeing others suffer painful experiences when the stimuli appear (Berger, 1962; Bandura & Rosenthal, 1966; Craig & Weinstein, 1965). Instrumental responding can similarly be brought under new stimulus control as a result of observing behavior of others that is rewarded whenever certain stimuli are present and ignored or punished when performed in other contexts (McDavid, 1962, 1964; Wilson, 1958).

Some researchers (Gewirtz & Stingle, 1968) have concerned themselves particularly with the appearance of first imitative responses on the assumption that they help to explain subsequent observational learning. According to these authors, initial imitative responses may emerge by chance, through physical guidance, or be gradually shaped by differential reinforcement of randomly emitted behavior. These imitations are presumably strengthened through direct reinforcement. Eventually response similarity becomes a discriminative stimulus signifying probable consequences and intermittent external reinforcement of matching behavior produces generalized imitation of different models in diverse situations even though such behavior is not always rewarded.



There is some reason to question whether conditions governing initial imitations necessarily explain subsequent observational learning. Modeling phenomena are by no means equivalent at different periods of development; consequently, the determinants of early imitations may provide an insufficient or even a misleading explanation of how modeled responses are later acquired.

In early years imitative responses are evoked directly by a model's actions, but in later periods matching behavior is typically performed long after exposure to modeling stimuli and in the absence of the model. Immediate imitation does not require much in the way of symbolic functioning because the behavioral reproduction is externally guided by the model's performance. By contrast, in delayed imitation the absent modeled events must be internally represented in symbolic form, and covert rehearsal and organizational processes that facilitate long-term retention of acquired contents emerge as important determinants of observational learning.

There is no doubt that rewarding imitative gestures, vocalizations, and social responses in young children will increase their willingness to adopt behavior displayed by others. However, prior intermittent reinforcement of matching responses in no way explains why people who transform modeling stimuli into easily remembered verbal schemes achieve better acquisition and retention of modeled responses than those who do not verbally code the external behavioral events for memory representation (Bandura & Jeffery, 1971; Gerst, 1971). Under these types of conditions, variations in modeling are accounted for by cognitive functions rather than by past history of reinforcement.

Given the importance of cognitive functioning in observational learning, the experimental paradigm regularly employed in operant conditioning studies of imitation may be poorly suited to its elucidation. In the standard procedure a model exhibits discrete responses which observers copy either during or immediately after demonstration. Instantaneous matching can occur without much symbolic representation or learning for that matter, just as individuals can successfully assemble a complicated apparatus by following a continually accessible set of directions, yet be unable to produce the correct performances when the external aids are removed. The difference between physically prompted and delayed imitation is analogous to the difference between drawing a picture of one's automobile when it is at hand, and from memory. In the latter situation, the hand does not automatically sketch the car; rather one must rely on memory guides, mainly in the form of mental images.

Exposure to modeled performances often fails to produce matching behavior in observers. When this occurs in young children who have been explicitly instructed to reproduce demonstrated activities, the children are often characterized as lacking an "imitative repertoire." Imitative behavior is defined in terms of its similarity to a modeled pattern rather than as a specific set of responses, and hence it may take a variety of forms. It is therefore unclear what an "imitative repertoire," which implies a specific collection of contents, would represent. As previously noted, people may fail to imitate behavior within their capabilities for a number of reasons. They may lack requisite components, or they may be capable of but unwilling to perform the desired behavior. In an experiment reported by Bandura and Barab (1971), grossly retarded children who had displayed no matching behavior even when actively encouraged to do so promptly imitated every modeled response when rewards were changed and when a familiar person demonstrated the behavior. These findings, together with data cited earlier, indicate a need for caution in attributing deficiencies in imitative performance to deficits in imitative learning.



## *Scope of Modeling Influences*

It is widely assumed that imitation can produce at best mimicry of specific responses exhibited by others. There are several reasons why such limited learning effects are ascribed to imitation. The term carries a strong connotation that the process is confined to literal copying of particular modeled responses. Formal definitions of imitation do not specify which properties of the model's behavior are adopted. Some investigators have therefore concluded that the phenomenon applies only to matching of simple physical characteristics. The behavior displayed by others ordinarily varies on a number of stimulus dimensions which differ in content, complexity, and discriminability. It is arbitrary which modeled attributes are selected as relevant in any given experiment. Although the matching process frequently involves reproduction of concrete patterns of behavior, in many instances observers must match subtle features common to a variety of modeled responses that differ on several other attributes.

Another factor that contributed to underestimation of the scope of modeling influences was the widespread use of a restricted experimental paradigm. In these studies a model performs a few responses designated by a single prominent feature and observers are subsequently tested for precise reproduction of the modeled behavior in identical or similar situations. Under these circumscribed conditions, experiments could yield only mimicry of specific responses. This led many researchers to place severe limitations on the behavioral changes that can be attributed to modeling influences.

In order to demonstrate that limitations ascribed to modeling were inherent in the methodology rather than in the phenomenon itself, several experiments were conducted (Bandura & Harris, 1966; Bandura & McDonald, 1963; Bandura & Mischel, 1965) requiring a more complex form of modeling. These studies utilized a paradigm in which persons observed models responding consistently to diverse stimuli in accordance with a pre-selected rule. Tests for generalized imitation were later conducted by different experimenters, in different social contexts with the models absent, and with different stimulus items. The results disclosed that observers respond to new situations in a style that is consistent with the models' dispositions without ever having observed the models responding to these particular stimuli.

In this higher-order form of modeling the performer's behavior conveys information to observers about the characteristics of appropriate responses. Observers must abstract common attributes exemplified in diverse modeled responses and formulate a rule for generating similar patterns of behavior. Responses performed by subjects that embody the observationally derived rule are likely to resemble the behavior that the model would be inclined to exhibit under similar circumstances, even though subjects had never witnessed the model's behavior in these new situations.

Evidence that response-generative rules can be acquired observationally has interesting implications for controversies regarding language learning. Because of the highly generative character of linguistic behavior it has commonly been assumed by psycholinguists (Brown & Bellugi, 1964; Ervin, 1964; Menyuk, 1964) that imitation cannot play much part in language development and production. This conclusion is largely based on the mistaken assumption that one can learn through observation only the concrete features of behavior, not its abstract properties. Obviously children are able to construct an almost infinite variety of sentences that they have never heard. Therefore, rather than acquiring specific utterances through imitation, children must learn sets of rules on the basis of which they can generate an unlimited number of novel grammatical sentences. The importance of imitative learning in language development was further discounted on the grounds that children often display only crude approximations of adult verbalizations (Brown & Bellugi, 1964), and they can acquire linguistic rules without engaging in any motor speech (Lenneberg, 1967).



The above criticisms have validity when applied to theories of imitation that emphasize verbatim repetition of modeled responses and that assume matching responses must be performed and reinforced in order to be learned. It is evident from the material already discussed at length that the social learning interpretation of modeling processes is compatible with rule-learning theories advanced by psycholinguists. Both points of view assign special importance to the abstraction of productive rules from diverse modeled examples. The differentiation made by psycholinguists between language competence and language performance corresponds to the distinction made between learning and performance in social learning theory. Another point of similarity is that neither approach assumes that observational learning necessitates performance. Finally, the basic rules, or prototypes, that guide production of grammatical utterances are presumed to be extracted from individual modeled instances rather than innately programmed. People are innately equipped with information-processing capacities, not with response-productive rules.

Rules about grammatical relations between words cannot be learned unless they are exemplified in the verbal behavior of models. A number of experiments have been conducted to discover conditions that facilitate abstraction of rules from verbal modeling cues. The principle underlying a model's varied responses can be most readily discerned if its identifying characteristics are distinctly repeated in responses which differ in other aspects. If, for example, one were to place a series of objects first on tables, then on chairs, boxes, and other things, simultaneously verbalizing the common prepositional relationship between these different objects, a child would eventually discern the grammatical principle. He could then easily generate a novel grammatical sentence if a toy hippopotamus were placed on a xylophone and the child were asked to describe the stimulus event enacted.

Changes in linguistic behavior are difficult to achieve because sentences represent complex stimulus patterns in which the identifying features of syntactic structure cannot be easily discerned.

The influential role of both modeling and discrimination processes in language development is revealed in an experiment designed to alter the syntactic style of young children who had no formal grammatical knowledge of the linguistic features selected for modification (Bandura & Harris, 1966). Children increased grammatical constructions in accord with the rules guiding the modeled utterances when verbal modeling influences were combined with attention-directing and reinforcement procedures designed to increase syntactic discriminability. This finding was replicated by Odom, Liebert, and Hill (1968) and extended by Rosenthal and his associates (Carroll, Rosenthal, & Brysh, 1969; Rosenthal & Whitebook, 1970), who demonstrated that exposure to verbal modeling altered structural and tense components of children's linguistic behavior congruent with the model's sentence rules.

The studies cited above were principally devoted to the modification of linguistic features with which the children had some familiarity. A recent study by Liebert, Odom, Hill, and Huff (1969) has shown that children can acquire through modeling an arbitrary ungrammatical rule, which they use to generate peculiar sentences.

Further evidence for the influential role of modeling processes in language acquisition is provided by naturalistic studies employing sequential analyses of children's verbalizations and the immediately following parental responses. Such studies disclose that young children's speech is at best semi-grammatical; in approximately 30 percent of instances adults repeat children's verbalizations in a grammatically more complex form, accenting the elements that may have been omitted and inaccurately employed (Brown & Bellugi, 1964); and children often reproduce the more complicated grammatical reconstructions modeled by adults (Slobin, 1968). Of special interest is evidence (Lovaas, 1967) that the accuracy of children's imitations is subject to reinforcement control. That is, when rewards are contingent on correct reproduction of modeled responses, children display precise imitativeness. On the other hand, when children can gain rewards irrespective of the accuracy with which they reproduce modeled utterances, the fidelity of their matching responses deteriorates.



Additional illustrations of how behavior-guiding principles can be transmitted through modeling are provided in experiments designed to modify moral judgmental orientations (Bandura & McDonald, 1963; Cowan, Langer, Heavenrich, & Nathanson, 1969; Le Furgy & Woloshin, 1969); delay of gratification patterns (Bandura & Mischel; 1965; Stumphauzer, 1969); and styles of information-seeking (Rosenthal, Zimmerman, & Durning, 1970). Researchers have also begun to study how modeling influences alter cognitive functioning of the type described by Piaget and his followers. Some of these studies are concerned with the principle of conservation, which reflects a child's ability to recognize that a given property remains invariant despite external changes that make it look different (as when the same amount of liquid is poured into different shaped containers.) Young children who do not conserve are able to do so consistently as a result of observing a model's conservation judgments and supporting explanations (Rosenthal & Zimmerman, 1970). Moreover, conservation judgments induced through modeling generalize to new characteristics; they endure over time; and they do not differ from conservation concepts acquired by children in the course of their everyday experiences (Sullivan, 1967).

The broader effects of modeling influences are further revealed in experimental paradigms employing multiple models who display diverse patterns of behavior. Contrary to common belief, it is possible to create novel modes of response solely through imitation (Bandura, Ross, & Ross, 1963a). When individuals are exposed to a variety of models, they may select one or more of them as primary sources of behavior; but rarely do they confine their imitation to a single source, nor do they reproduce all of the characteristics of the preferred model. Rather, observers generally exhibit relatively novel responses representing amalgams of the behavior of different models. The particular admixtures of behavioral elements vary from person to person.

Within a given family even same-sex siblings may thus develop unlike personality characters as a result of imitating different combinations of parental and sibling attributes. A succession of modeling influences in which observers later became sources of behavior for new members would most likely produce a gradual imitative evolution of novel patterns bearing little resemblance to those exhibited by the original models.

The degree of behavioral innovation that can be achieved through imitation will depend on the diversity of modeled patterns. In homogeneous cultures in which all models display similar modes of response, imitative behavior may undergo little or no change across successive models, but model dissimilarity is apt to foster new divergent patterns. The evidence accumulated to date suggests that, depending on their complexity and diversity, modeling influences can produce, in addition to mimicry of specific responses, behavior that is generative and innovative in character.

## *Locus of Response Integration*

Development of new modes of response requires organization of behavioral elements into certain patterns and sequences. Theories of imitation differ as to whether component responses are integrated into new forms mainly at central or at peripheral levels. Despite the importance of the issue, there has been relatively little research on this aspect of observational learning.

Classical conditioning theories of imitation do not address themselves at all to the issue of response acquisition. They are principally concerned with associative processes whereby existing response patterns are brought under the control of social stimuli and endowed with positive or negative emotion-arousing properties. Instrumental conditioning formulations (Baer & Sherman, 1964; Gewirtz & Stingle, 1968) assume that constituent response elements are selected from overt performances by the joint influence of discriminative stimuli and differential reinforcement; the extracted components are then sequentially chained to form more complex arrangements of behavior. Since it is assumed that behavior is organized into new patterns in the course of performance, learning requires overt responding and immediate reinforcement.



In social learning theory (Bandura, 1969a), it is assumed that behavior is learned and organized chiefly through central integrative mechanisms prior to motor execution. By observing a model of the desired behavior, an individual forms an idea of how response components must be combined and temporally sequenced to produce new behavioral configurations. In other words, patterned behavior is largely guided by symbolic representation rather than formed through reinforced performance.

Observational learning without performance is abundantly documented in modeling studies using a nonresponse acquisition procedure (Bandura, 1965a; Flanders, 1968). After observing models perform novel modes of response, subjects can describe the entire pattern of behavior with considerable accuracy, and they often achieve errorless behavioral reproductions on the first test trial. These findings indicate that modeled behavior is learned as a whole in symbolic form before behavioral enactment.

It is commonly believed that controversies about the locus of learning cannot be satisfactorily resolved because learning must be inferred from performance. This may very well be the case in experimentation with animals. To determine whether a rat has mastered a maze one must run him through it. With humans, there exists a reasonably accurate index of learning that is independent of motor performance. To measure whether a human has learned a maze by observing the successful performances of a model, one need only ask him to describe the correct pattern of right-left turns. Such an experiment would undoubtedly reveal that people can learn through modeling before they perform.

In many instances, of course, observational learning alone is not sufficient to produce faultless performances. There are several reasons for this. When modeled patterns are observed briefly or only sporadically, individuals generally acquire at best a fragmentary sketch of the demonstrated activities. Behavioral reproduction is defective because the guiding internal representation is inadequate. Overt practice helps to identify the aspects that were missed entirely or only partially learned. Given the opportunity to observe the same behavior again, individuals are likely to concentrate their attention on the problematic segment to fill in the missing guides required for accurate performance.

Even when clear symbolic representation of modeled activities is developed and retained, behavioral enactment may be faulty because individuals do not have the physical capabilities necessary for the activities. A young child can learn observationally the behavior for driving an automobile, but if he is too short to operate the controls, he will be unable to perform the set of responses needed to maneuver the vehicle successfully.

Accurate behavioral enactment of modeled events is also difficult to achieve under conditions where the model's performance is governed by subtle adjustment of internal responses that are unobservable and not easy to communicate verbally. An aspiring operatic singer may benefit considerably from observing an accomplished voice instructor; nevertheless, skilled vocal reproduction is hampered by the fact that the model's laryngeal and respiratory muscular responses are neither readily observable nor easily described verbally.

The problem of behavioral reproduction is further complicated in the case of highly coordinated motor skills such as golf, in which a person cannot see most of the responses that he is making, and must therefore rely primarily on proprioceptive feedback cues and verbal reports of onlookers. It is exceedingly difficult to guide actions that are not easily observed or to identify the corrective adjustments needed to achieve a close match of symbolic model and overt performance. To facilitate development of motor skills, delayed self-observation through videotape procedures is increasingly employed. In most everyday learning, people achieve rough approximations of desired behavior by observation; their initial behavioral enactments are then further refined through self-corrective adjustments on the basis of informative feedback from performance.



## *The Modeling Process and Transmission of Response Information*

As previously noted, a major function of modeling stimuli is to transmit information to observers about how response elements must be organized to produce required patterns of behavior. This response information can be conveyed through physical demonstration, through pictorial representation, or through verbal description.

Much social learning occurs through casual or directed observation of performances by real-life models. Indeed, imitative learning in young children depends almost entirely upon behavioral modeling. As linguistic competence is acquired, verbal modeling is gradually substituted for behavioral modeling as the preferred model of response guidance. People are aided in assembling and operating complicated mechanical equipment, in acquiring social, vocational, and recreational skills, and in learning appropriate behavior for almost any situation by consulting the written descriptions in instructional manuals. Verbal forms of modeling are used extensively because one can transmit through words an almost infinite variety of behavioral patterns that would be exceedingly difficult and time-consuming to portray behaviorally. Moreover, since verbal description is an effective means of focusing attention on relevant aspects of ongoing activities, verbal modeling often accompanies behavioral demonstrations.

Another influential source of social learning at all age levels is the abundant and diverse symbolic modeling provided in television, films, and other audiovisual displays. There is a large body of research evidence (Bandura, 1969a; Flanders, 1968) demonstrating that both children and adults acquire attitudes, emotional responses, and complex patterns of behavior through exposure to pictorially presented models. In view of the efficacy of pictorial modeling and the large amount of time people spend watching televised productions, mass media may play an influential role in shaping behavior and social attitudes. With further developments in communication technology whereby any desired activity can be portrayed on request at any time on remote television consoles (Parker, 1970), parents, teachers, and other traditional role models may occupy less prominent roles in the social learning process as increasing use is made of symbolic modeling influences.

Response information can be transmitted, though less precisely, through modalities other than auditory and visual media. In learning to speak, deaf-blind persons rely on kinesthetic modeling by matching through touch the mouth and laryngeal muscular responses of verbalizing models (Keller, 1927; Young & Hawk, 1955).

Disputes have arisen in the literature because different labels are applied to these various modes of conveying response information. Some writers reserve the term "imitation" for instances in which observers reproduce responses which are demonstrated socially (Fouts & Parton, 1969), "copying" for mechanical demonstrations (Fouts & Parton, 1969), and "instructions" for verbal demonstrations (Masters & Branch, 1969). Others define copying as a special instance of imitation in which socially demonstrated behavior is precisely matched (Miller & Dollard, 1941). It would be advantageous to use diverse concepts if the changes produced through different information modes involve fundamentally different learning processes. If, on the other hand, they reflect essentially the same learning process, then arbitrary conceptual distinctions are more likely to obscure than to clarify the phenomenon.

Social learning theory (Bandura, 1969a) is more concerned with the process whereby representation of patterned activities serves a response guidance function than with the particular form in which response information is presented. It is assumed that the basic matching process is the same regardless of whether the desired behavior is conveyed through words, pictures, or actions.

Controversies emerge about the conditions considered to be essential for modeling when the phenomenon is defined in terms of how the requisite activities are portrayed. In several experiments Parton and his associates (Dubanoski & Parton, 1968; Fouts & Parton, 1969) compared the accuracy with which children placed objects in selected locations after observing a film in which object placements were made by a person in full view, by a hand, by moving the objects with nylon thread, or by a sweep of the camera depicting the objects alone and then in their appropriate locations. Not unexpectedly, comparable matching performances were obtained regardless of the mode of conveyance.



Human transmitters are widely employed in modeling experiments, not because this is the only means of response guidance, but because under conditions of everyday life response patterns are usually depicted, whether deliberately or inadvertently, through social demonstration. Moreover, in the case of most social behavior the model's actions are the critical events, and to remove the social model is to erase the behavior. How, for example, can one have a march without a marcher, verbal responses without a speaker, or a punch without a puncher? I hope that this statement does not prompt researchers to initiate studies in which plastic arms propelled by invisible strings strike objects in an effort to prove that people are dispensable sources of behavior.

Investigations of symbolic modeling (Bandura & Mischel, 1965; Bandura, Ross, & Ross, 1963a) demonstrate that matching performances can be readily achieved without requiring the physical presence of a model if the essential features of his behavior are accurately depicted either pictorially or verbally. To the extent that live and symbolic modeling convey the same amount of response information and are equally effective in commanding attention, they are likely to produce comparable levels of imitative behavior. Different forms of modeling, however, are not always equally efficacious. Performances that entail strong inhibitions may be more easily established through live demonstrations than by filmed presentations (Bandura & Menlove, 1968). One might also expect observers who lack conceptual skills to benefit less from verbal modeling than from behavioral demonstrations.

Establishment of new response patterns through the medium of verbal modeling is often designated as "instructions" and distinguished from modeling as though they represented dissimilar influence procedures. In examining the process of verbal control of behavior it is essential to distinguish between the instigational and the modeling functions of instructions. Words can be used to impel people to perform previously learned activities and to teach them new behaviors. Instructions are most likely to produce correct performances when they both instigate a person to respond and describe the requisite behaviors and the manner in which they are to be executed. Little would be gained by simply ordering a person who had had no prior contact with cars to drive an automobile. In studies ostensibly comparing the relative efficacy of instructions and verbal modeling (Masters & Branch, 1970), both types of influences produce their effects through verbal modeling and they differ only in the explicitness with which the desired responses are defined. Greater performance gains are attained when desired behavior is clearly specified than when it must be inferred from a few examples.

Explanations of modeling phenomena usually cease at the point where modeling stimuli are attributed informative functions. As shown earlier, the psychological analysis must be extended beyond this level to explain how information conveyed by modeling stimuli is coded, the representational forms in which it is stored, and the process whereby representation guides action. Modeling stimuli assuredly do more than just convey information. They can also produce strong emotional and evaluative consequences that significantly affect both acquisition of new patterns of behavior and performance of existing ones (Bandura, 1971a).

## *The Role of Reinforcement in Observational Learning*

An issue of considerable interest is whether reinforcement is necessary for imitative learning. As previously noted, reinforcement-oriented theorists (Baer & Sherman, 1964; Miller & Dollard, 1941; Gewirtz & Stingle, 1968) assume that imitative behavior must be reinforced in order to be learned. Social learning theory (Bandura, 1965b; 1969a) distinguishes between acquisition and performance of matching behavior. According to this view, imitative learning can occur through discriminative observation of modeled events and accompanying cognitive activities in the absence of external reinforcement. It is evident, however, that mere exposure to modeling stimuli is not in itself sufficient to produce imitative learning since not all stimulation impinging on individuals is necessarily observed by them. An adequate theory must include factors that exercise control over attending responses.



Anticipation of reinforcement is one of several variables that can influence what is observed and what goes unnoticed. Knowledge that performance of matching behavior produces valued rewards or averts punishment is likely to increase attentiveness to models whose behavior has functional value. Thus, reinforcement, through its incentive motivational effects, may indirectly affect the course of imitative learning by enhancing and focusing observing responses. Moreover, anticipated consequences can strengthen retention of what has been learned observationally by motivating people to code and to rehearse modeled responses that have utilitarian value. Controversy among theories of modeling centers on the manner in which reinforcement influences learning since all theorists agree that it does play a role in the acquisition process. As shown in the diagrammatic representation, the question in dispute is whether reinforcement functions retrospectively to strengthen preceding responses and their association to stimuli, or whether it facilitates learning through its effects on attentional, organizational, and rehearsal processes.

*Reinforcement Theories*

$$S_{\substack{\text{modeling}\\\text{stimuli}}} \rightarrow R \rightarrow S^{\text{Reinf.}}$$

*Social Learning Theory*

$$\text{Anticipated } S^{\text{Reinf.}} \rightarrow \text{Attention} \rightarrow S_{\substack{\text{modeling}\\\text{stimuli}}} \rightarrow \left\{\begin{array}{l}\text{Symbolic Coding}\\ \text{Cognitive Organization}\\ \text{Rehearsal}\end{array}\right\} \rightarrow R$$

In social learning theory reinforcement is considered a facilitatory rather than a necessary condition because factors other than response consequences can also exercise selective control over attention. People will learn modeled events that command attention because of their striking physical properties, or because they have acquired distinctiveness and affective valence through prior experiences. One does not have to be reinforced to hear compelling auditory stimuli, to look at prominent visual displays, or to gaze at fetching belles. Indeed, when attention is effectively channeled to modeling stimuli through physical means, the addition of positive incentives does not affect the level of observational learning (Bandura, Grusec, & Menlove, 1966). Children who watched intently modeled activities presented on a television screen in a room darkened to eliminate distractions later displayed the same amount of imitative learning regardless of whether they were informed in advance that correct imitations would be rewarded or were given no prior incentives to learn the modeled performances. Anticipated positive consequences for matching behavior would be expected to influence self-regulated observational learning in which individuals can choose whom they will observe and for what length of time.

Both operant conditioning and social learning theories assume that performance of acquired matching behavior is strongly controlled by its consequences. But in social learning theory, behavior is regulated not only by directly experienced consequences arising from external sources, but also by vicarious reinforcement and self-reinforcement (Bandura, 1971a). In everyday life people continually observe the actions of others and the occasions on which they are rewarded, ignored, or punished. Observed consequences not only influence performance of similar behavior; they also determine whether a particular external reinforcer will function as a reward or as a punishment. Since direct and vicarious reinforcement occur together under natural conditions, the maintenance of behavior can best be understood by considering the interactive effects of these two sources of influence.



Not all human behavior is controlled by immediate external reinforcement. People regulate their own actions to some extent by self-generated anticipatory and self-evaluative consequences. At this higher level of psychological functioning, people set themselves certain performance standards, and they respond to their own behavior in self-rewarding or self-punishing ways, depending on whether their performances fall short of, match, or exceed their self-imposed demands. After a self-monitored reinforcement system is established, a given performance produces two sets of consequences—a self-evaluative reaction as well as some external outcome. In many instances self-produced and external consequences may conflict, as when externally approved courses of action, when carried out, give rise to self-devaluative reactions. Under these circumstances, the effects of self-reinforcement may prevail over external influences. Conversely, response patterns may be effectively maintained by self-reward under conditions of minimal external support or approval.

## *Interpretation of Vicarious Reinforcement*

It is possible to arrange laboratory situations in which an individual observes another's behavior without seeing the consequences it produces. However, in everyday life modeled performances are invariably accompanied by outcomes which affect the degree to which observers act in a similar manner. The term vicarious reinforcement is applied to changes in the behavior of observers that result from witnessing a model's actions being rewarded or punished. As in the case of direct reinforcement, the influence of vicarious reinforcement varies according to the conditions under which it is administered, and whether the effects are measured in terms of learning or performance.

When individuals observe a single sequence of behavior followed by different outcomes they learn what they have seen regardless of whether the model's actions are rewarded, punished, or ignored (Bandura, 1965b). When a model is repeatedly reinforced as he displays an ongoing series of responses, observation of reinforcing consequences occurring early in the sequence might increase observers' attentiveness to the behavior that the model subsequently displays. People are inclined to pay little attention to models who have proved ineffectual but to observe closely models whose actions have been successful in the past. Vicarious reinforcement can indirectly affect the course of observational learning if repeated opportunities are given to observe modeled performances, the observer values the observed consequences, and he assumes that matching behavior will produce similar outcomes for him.

Imitative behavior is generally increased by observed reward and decreased by observed punishment. It should be noted here that vicarious reinforcement is simply a descriptive term that does not contain any explanation of how observed consequences affect behavior. Several different formulations have been proposed to explain its mode of operation.

According to Lewis and Duncan (1958), during the acquisition phase the model's responses elicit covert verbalizations in observers. The observed consequences are also experienced vicariously. As a result of contiguous occurrence, the pleasurable effects of observed reward and the frustrative effects of observed nonreward become conditioned to the observer's covert verbalizations. It is further assumed that these vicariously established emotions are transmitted from verbalizations to similar motor actions on the basis of prior associations between the two modes of responding.

There is some evidence that observers can develop conditioned emotional reactions as a result of seeing others endure painful consequences. It remains to be demonstrated whether observed nonreward is emotionally arousing to observers; whether observers covertly verbalize the model's instrumental responses while observing them performed; and whether emotional properties are, in fact, conditioned to verbalizations. In the more cognitive interpretation of classical conditioning (Bandura, 1969a), if a stimulus is paired with aversive experiences, the stimulus alone can produce emotional responses, not because it is invested with



emotional properties, but because it tends to elicit emotion-arousing thoughts. In other words, the emotional responses are to a large extent cognitively induced rather than automatically evoked by the conditioned stimuli. From this perspective, performance of responses that individuals had previously seen punished can instigate anticipatory self-arousal without requiring that emotional responses be conditioned initially to covert verbalizations which serve as a vehicle for connecting emotions to overt actions.

Proponents of the operant conditioning view emphasize the discriminative rather than the emotional conditioning functions of observed reinforcement. Consequences administered to a model are treated as discriminative stimuli which indicate to observers that responses belonging to the same general class are likely to be reinforced in a similar manner (Gewirtz & Stingle, 1968). Since observed consequences are not present to serve as guiding stimuli when imitative behavior is performed, presumably the distinctive features of the environment or the behavior itself assume the controlling role.

According to social learning theory (Bandura, 1971a), vicarious reinforcement may operate through at least six different mechanisms to produce psychological changes in observers. One explanation is in terms of the *informative function* of observed outcomes. Response consequences experienced by other people convey information to observers about the type of behavior that is likely to meet with approval or disapproval. Knowledge about probable response consequences can aid in facilitating or inhibiting analogous responding. Unlike the operant conditioning interpretation, the social learning formulation assumes that imitative behavior is regulated by observers' judgments of probable consequences for prospective actions rather than being directly controlled by stimuli that were correlated with reinforcement. The influential role of cognitive regulatory factors is revealed in studies (Bandura & Barab, 1971) showing that erroneous judgments about likely response consequences may be more powerful in controlling imitative behavior, at least for a time, than discriminative stimuli and the actual effects the responses produce. These findings are consistent with research on nonimitative behavior (Kaufman, Baron, & Kopp, 1966) demonstrating that the reinforcement schedules people believe to be in effect can outweigh the influence of the reinforcements that are actually imposed on their behavior.

When the same behavior is treated differently depending on the social circumstances under which it is performed (as is often the case), vicarious reinforcement enables observers to identify situations in which the modeled activities are likely to be well received or censured. The resultant *environmental discriminations* (McDavid, 1964; Wilson, 1958) may facilitate performance of matching behavior in situations where the model previously responded with favorable consequences. Conversely, individuals will refrain from behaving imitatively in situations in which they have seen others punished for similar actions.

Observed reinforcement is not only informative but it can also have *incentive motivational effects.* Seeing others reinforced with valued incentives functions as a motivator by arousing the observer's expectations that he will be similarly rewarded for imitative behavior. Anticipation of rewards determines the speed, intensity, and persistence with which matching behavior is performed (Bruning, 1965; Rosenbaum & Bruning, 1966; Berger & Johansson, 1968).

Models generally exhibit emotional reactions while undergoing rewarding or punishing experiences. Observers are easily aroused by the emotional expressions of others. These vicariously elicited emotional responses can become conditioned either to the modeled behavior itself or to environmental stimuli that are regularly associated with performers' distress reactions (Bandura & Rosenthal, 1966; Berger, 1962; Craig & Weinstein, 1965). As a consequence, later performance of similar responses by the observer or the presence of negatively valenced stimuli is likely to evoke fear and response suppression. Emotional arousal and behavioral inhibitions can also be extinguished by having fearful observers watch performers engage in the threatening activity without experiencing any adverse consequences (Bandura, 1971b). *Vicarious conditioning and extinction of emotional arousal* may, therefore, partially account for the behavioral suppression or facilitation that results from observing affective consequences accruing to models.



In addition to the aforementioned effects of vicarious reinforcement, social status can be conferred on performers by the manner in which their behavior is reinforced. Punishment tends to devalue the model and his behavior, whereas the same model would be a source of emulation if his actions were praised and otherwise rewarded (Bandura, Ross, & Ross, 1963b; Hastorf, 1965). *Modification of model status* influences the degree to which observers pattern their own actions after behavior exemplified by different models.

Observed reinforcements can alter the *valuation of reinforcing agents* as well as recipients. When people misuse their power to reward and punish they undermine the legitimacy of their authority and generate strong resentment. Seeing inequitable punishment may free incensed observers from self-censure of their own actions, rather than prompting compliance, and thus increase transgressive behavior. Otherwise considerate people can readily be provoked to behave cruelly without remorse by observed injustice. Vicarious reinforcement, depending on its nature and context, may thus affect the level of imitative responding through any one or more of the processes discussed above.

## *Maintenance of Nonreinforced Modeling*

Closely related to the issue of whether reinforcement is indispensable for observational learning are the explanations of why people continue to perform imitative responses that are not explicitly reinforced. Baer (Baer, Peterson, & Sherman, 1967; Baer & Sherman, 1964) and other researchers working within the operant conditioning framework (Lovaas, 1967), have interpreted the phenomenon, which they label "generalized imitation," in terms of conditioned reinforcement. The hypothesis assumes that repeated positive reinforcement of matching responses endows similarity with rewarding properties. After similarity has become reinforcing in itself persons are disposed to perform imitative responses for their inherent reward value.

Explanation of nonreinforced imitation in terms of conditioned reinforcement has been questioned by other investigators on both conceptual and empirical grounds (Bandura & Barab, 1971; Steinman, 1970a, b; Zahn & Yarrow, 1970). The theory explains more than has ever been observed. If behavioral similarity is inherently rewarding, then people should imitate all types of behaviors they see modeled, whereas, in fact, people tend to be highly selective in the behaviors they adopt from others (Bandura, 1969b). A conditioned reinforcement interpretation would have to posit counteracting influences to explain why people do not imitate indiscriminately everything they happen to observe.

A number of experiments have been performed to evaluate alternative hypotheses about the conditions governing nonreinforced imitation. The laboratory procedure that is commonly used to demonstrate the occurrence of nonreinforced imitation (Baer & Sherman, 1964) includes a variety of extraneous rewards and coercive pressures for imitative responding. One of the more forceful influences occurs when models instruct children to perform the demonstrated behavior and wait expectantly for aversively long intervals when children fail to respond imitatively. As might be expected, nonreinforced imitations assumed to be maintained by their inherent reward value cease when external social controls are removed (Peterson & Whitehurst, 1970; Steinman, 1970a, b; Zahn & Yarrow, 1970).

In everyday life imitative behavior is often performed without explicit external reinforcement even when coercive social controls are absent. This phenomenon may be partly attributable to discrimination processes. It has been demonstrated that people regulate their behavior to a large extent on the basis of anticipated consequences. These anticipated consequences are established on the basis of differential reinforcements that individuals



have previously experienced in relation to different behavior, different people, and different situations; they are inferred from observed response consequences of others; or they may be conveyed through verbal explanations. In many instances, these various sources of information about reinforcement contingencies conflict. The problem of accurately assessing probable consequences is further complicated by the fact that diverse outcomes are often due to subtle differences in behavior. The same behavior may be rewarded, ignored, or punished depending upon the person toward whom it is expressed, the social setting in which it is exhibited, temporal considerations, and many other factors.

According to the discrimination hypothesis, nonrewarded imitations persist in the absence of extraneous social controls because individuals fail to discriminate the basis on which diverse modeled behaviors are reinforced. Support for this interpretation is provided in a study by Bandura and Barab (1971) that measured imitation as a function of differential consequences conveyed by model characteristics and features of the behavior itself. Children discontinued imitating nonrewarding models and nonreinforced responses that were easily distinguishable, but they continued to perform nonrewarded matching responses that were difficult to discriminate from rewarded imitations.

The overall research findings cast serious doubt on the view that response similarity functions as a conditioned reinforcer in maintaining imitative behavior. However, such behavior can be rendered partially independent of its external consequences through self-reinforcement of imitative performances. To the extent that individuals respond self-approvingly when they achieve close matches to meritorious performances, they can reinforce their own behavior without the necessity of external reinforcement.

## *Correlates of Modeling*

In discussions of imitation the question often arises as to the types of people who are most responsive to modeling influences, and the kinds of models most likely to evoke imitative behavior from others. A great deal of research has been published on this topic (Bandura & Walters, 1963, Campbell, 1961; Flanders, 1968), but the generality of the findings is open to question because of the limited conditions under which observer and model correlates of imitative behavior have been measured.

It is often reported that persons who lack self-esteem, feel incompetent, are highly dependent, of low intelligence, or who have been frequently rewarded for imitative responses are especially prone to adopt the behavior of successful models. These prosaic correlates are based mainly on results from ambiguous experimental situations in which unfamiliar models perform inconsequential responses that have little or no functional value for subjects. In such situations the main rewards for brighter and bolder subjects are derived from outwitting the experimenter by disregarding the modeling influences.

Unfortunately, there is a paucity of research studying the degree to which people differing in intelligence, perceptiveness, and confidence emulate idealized models and those whose behavior has high utilitarian value. It is exceedingly unlikely that dull, dependent, and self-devaluative students would profit more from observing skillful performances by ski instructors, brain surgeons, airline pilots, or ingenious researchers than understudies who are bright, attentive and self-assured. When modeling influences are explicitly employed to teach people how to communicate effectively, how to conduct themselves in given interpersonal situations, and how to perform occupational activities competently, the more venturesome and talented are apt to derive the greater benefits from observation of exemplary models.

The traditional model correlates of imitation should also be accepted with reservation for similar reasons. It has been abundantly documented in social-psychological research (Bandura, 1969b; Blake, 1958; Campbell, 1961) that models who are high in prestige, power, intelligence, and competence are emulated to a considerably greater degree than models of subordinate standing. The influence of model status on matching behavior is generally explained in terms of differential reinforcement and generalization processes (Miller & Dollard, 1941). According to this interpretation, the behavior of high status models is more likely to be successful in achieving desired outcomes, and hence have greater value for observers, than the behavior of models who possess relatively low vocational, intellectual and social competencies. As a result of experiencing different outcomes for imitating models who possess diverse attributes, the identifying characteristics and status-conferring symbols assume informative value in signifying the probable consequences associated with behavior exemplified by different models. The effect of a model's prestige tends to generalize from one area of behavior to another and even to unfamiliar models who share characteristics with known reward-producers.



Model characteristics exert the greatest influence on imitation under conditions in which individuals can observe the model's behavior but not its consequences. When the value of modeled behavior is not revealed, observers must rely on such cues as clothing, linguistic style, general appearance, age, sex, likeableness, and various competence and status symbols as the basis for judging the probable efficacy of the modeled modes of response. Since the informative value of these cues is mainly derived from their correlation with reinforcement in the observer's past experience, they may not always be reliable predictors of how useful the behavior of new models, who happen to resemble former persons in some way, might be.

Ordinarily, modeled performances produce evident outcomes both for the model and the imitator. Response consequences generally outweigh model characteristics in promoting imitative behavior. One would not expect matching behavior that is primarily sustained by anticipatory consequences arising from model attributes to survive for long in the face of actual adverse outcomes. A prestigious or attractive model may induce a person to try a given course of action, but if the behavior should prove unsatisfactory, it will be discarded and the model's future influence diminished. For these reasons, studies conducted under conditions in which response consequences are not displayed may exaggerate the role played by model characteristics in the long-term control of imitative behavior.

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# 1 *Mimicry in Mynas (Gracula Religiosa): A Test of Mowrer's Theory*

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Mowrer (1950, chap. 24) states that sounds must be associated with reinforcement for talking birds to imitate them. In his most recent formulation (Mowrer, 1960) the reasoning is as follows: if any stimulus, for instance the sight of a human being, is repeatedly associated with a primary reinforcer (e.g., food) then the appearance of the human will give rise to "hope," which in turn is reinforcing; if the human repeatedly utters a given sound, that sound will also produce hope; if now the bird, in the course of its babbling, makes noises which approximate those produced by the human, these will produce hope, and the production of the noises will be reinforced—the more so the more the noises approach the human version.

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