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THE INFLUENCE OF A MODEL ON THE DEVELOPMENT OF ADAPTIVE AND MALADAPTIVE PROBLEM SOLVING BEHAVIOR IN CHILDREN

by

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ABSTRACT

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This paper presents two studies which deal with the influence of a model on the development of adaptive and maladaptive problem-solving behavior in children. The first study involved exposing eight and nine year old children to a model who acted in either an adaptive or a maladaptive manner on a form-board task. Adaptive and maladaptive behaviors were defined in terms of the amount of reinforcement earned. There was also a control condition, where the model exhibited task-irrelevant behavior. There were also two exposure-time conditions, one minute and two minutes. It was hypothesized that children would imitate the behavior of their respective models and would act either adaptively or maladaptively as a function of the model's performance. Children in the control groups were expected to behave at an intermediate level. It was also expected that the degree of influence of the model would be a function of the amount of exposure time. The results supported the first hypothesis, but not the exposure-time hypothesis. Sex of the subjects was also looked at as a variable, which yielded non-significant results. A second study was run to clarify the exposure-time issue. Subjects were again exposed to a model who acted in either an adaptive or a maladaptive manner, but this time the amount of exposure-time varied between 5 and 20 seconds. Significant results were obtained, and explained on the basis of a "maximal model effect". The degree of imitation of a model was a direct function of the exposure time and increased up until a maximal model effect occured. Various theoretical positions were also dealt with, in an attempt to determine which position could best account for the results of the two studies.

Preface

This paper deals with the influence of a model on the development of adaptive and maladaptive problem solving behavior in observers. In order to fully understand the processes involved in the studies reported, it is necessary for the reader to be familiar with a greater portion of the theoretical literature and research on vicarious learning and modeling phenomena. This paper therefore involves an attempt to deal with this literature by arranging various portions of it into comprehensible categories.

Some of the most relevant theories of modeling are first described, along with some supporting research. It is hoped that a basic theoretical knowledge will enable the reader to more fully understand the intricacies of the studies to be later described. Following this, the discussion centers upon some of the basic processes which underlie imitative learning, as well as with some of the reinforcement variables which influence this learning. A brief description of the training conditions by which imitative behaviors are acquired in subjects, will hopefully clarify any ambiguities which may have arisen in the previous sections. The reader will by now have undoubtedly become aware that many variables besides reinforcement per se, influence vicarious learning. The next section therefore focuses on some of these variables and on some related research. The final section of this review deals with the utilization of modeling procedures to teach new behaviors to observers, as well as with the amelioration of behavior problems.

From this review, the reader will discover that a very extensive literature on modeling phenomena has evolved. However, there does seem to be a dearth of studies in one particular area; the influence of a model on the development of maladaptive behavior. The studies described in this paper deal with just this question. Hopefully, this research review will better equip the reader to understand these studies.

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INTRODUCTION

One of the main ways that new behaviors are acquired and already existing behaviors are changed or modified involves modeling processes (Bandura, 1969a). Learning that occurs through or as a result of modeling is commonly called vicarious learning, observational learning, or imitative learning. Imitation or imitative behavior is commonly regarded as that behavior which an observer performs which is similar or identical to that of a model, and which occurs as a result or by way of observational learning. According to Flanders (1968a, p. 316) imitation consists of the following:

> "An observer (O) is said to imitate a model (M) when the observation of the behavior of M, or of expressions attributing certain behavior to M, affects O so that O's subsequent behavior becomes similar to the observed, or the alleged behavior of M".

It has been repeatedly demonstrated (Bandura, 1965a; Bandura, 1969a) that most learning phenomena that occur as a result of direct reinforcement also occur as a result of vicarious reinforcement, i.e., through modeling processes. It is possible that behaviors may be acquired, modified, or eliminated in a subject as a result of observing a model just as readily as they could if direct reinforcement and/or punishment processes were utilized.

Bandura (1969a) claims that there are generally three main effects on the behavior of an individual which can occur as a result of being exposed to a model. One effect is that an observer can acquire new responses in his behavior repertoire that did not previously exist. A second effect is that a model can have an inhibitory influence upon the

behavior of an individual. The converse of this can also occur whereby a model can have a facilitative or disinhibitory effect upon the behavior of an observer. In order for the first effect to occur, a model would have to exhibit certain behaviors which are novel to the observer. The observer must then closely approximate these behaviors. The other two effects can occur when an observer witnesses a model experience either positive or negative outcomes for his behavior.

These three processes and related research will be discussed at a later point in this paper when some of the research on modeling is reviewed.

Theories of Modeling

A brief description of some of the more important theories of modeling will be presented in this section as well as some relevant research which supports these theories. Most of the research on modeling, however, will be presented in a later section of this paper.

Holt (1931) and Allport (1924) have presented some associative and classical conditioning theories of modeling. Basically, these theories state that imitation involves the temporal contiguity between modeling stimuli and the imitator's matching response. The model and the imitator must both perform the same behaviors contiguously. As the associative sequence continues, any novel behaviors which are performed by the model are copied by the observer. These associative theories only partially explain the complex modeling phenomenon. They do not account for the fact that many responses are acquired by an observer through more observation of a model, in the absence of any performance on behalf of the

observer.

Miller and Dollard (1941) presented one of the first instrumental conditioning or reinforcement theories of modeling. Reinforcement theories are based upon the assumption that observational learning and subsequent imitation occur as a result of the observer being reinforced for such behavior. Miller and Dollard (1941) present research which clearly demonstrates that an observer will imitate a model if he is reinforced for doing so. In their research, they also demonstrate that the observer relies upon the model for relevant cues and then matches these reinforcement-contingent (cue) behaviors. Miller and Dollard call this imitative behavior, matched-dependent behavior.

Like the contiguity theorists, Miller and Dollard only explain certain aspects of a complex phenomenon. In their paradigm, the model's behavior provides a discriminative stimulus for the production of certain behaviors by the observer. Reinforcement is a necessary element in this process. In many cases, however, vicarious learning and subsequent performance occur in the absence of any direct reinforcement given to the observer (Bandura, 1965a).

Miller and Dollard's theory is important because it laid the groundwork for the empirical study of modeling, imitation, and vicarious or observational learning. Given the state of the science at the time, their emphasis on direct reinforcement was justified. Their claim, however, that imitation presupposes direct reinforcement was false. The theory is too limited. Studies demonstrate that many variables other than direct reinforcement to an observer affect imitation. The theory proposed by Miller and Dollard seems to account more adequately for the performance

of previously learned behaviors which are matched to the model's behavior rather than the acquisition of new behavior. The behavior must occur and it is then reinforced if it closely approximates the behavior of a model. Clearly, a more inclusive theory is required.

Skinner (1953) and Baer and Sherman (1964) have also proposed that direct reinforcement is a necessary condition for observational learning. Their theory, however, is more inclusive than that proposed by Miller and Dollard. The observer learns to imitate gradually through a process of differential reinforcement. The process of learning to imitate undoubtedly begins in early childhood. Through this process, only behaviors which closely approximate those of a model come to be reinforced. The behaviors of certain others, therefore, become discriminative stimuli, for which matching behaviors will be reinforced.

Skinner uses the following paradigm in his analysis of modeling;

$$S^d \longrightarrow R \longrightarrow S^r$$

S^d is the discriminative stimulus; a model's behavior. R is an overt matching response made by the observer, and S^r is a reinforcement for his behavior. The person, therefore, learns to imitate. This scheme can apply to situations where reinforcement is not administered to either the model or the observer. The observer may still imitate the model though, this being explained by the principle of partial reinforcement and generalized imitation (this will be expanded upon in following paragraphs). New behaviors can be learned on this basis. However, it is important to note that the observer must first have learned to imitate by being directly reinforced for such behavior.

Any model can acquire S^d significance, within certain limits, through the process of stimulus generalization. Covert symbolic responses also acquire S^d properties. In other words, cognitive representation of a model's behavior can serve as cues for an observer's imitative behavior. This paradigm can also explain the process of vicarious reinforcement whereby the model, and not the observer, is reinforced for behaving in a certain manner. Yet, in similar future situations, the observer will imitate the model, even though he had never been reinforced in the past for imitating that particular model. Any reinforcement which the model recieves can be symbolically represented by the observer. In similar situations, these covert symbolic representations facilitate the production of imitative behaviors. The act of imitation can also acquire secondary reinforcing properties, by being paired with reinforcement, and eventually imitation per se becomes reinforcing.

As previously mentioned, imitative behavior often occurs in the absence of direct reinforcement and in many diverse situations. This has been termed "generalized imitative behavior" (Gerwitz & Stingle, 1968). Some interesting attempts have been made to explain this phenomenon.

It seems that although only a few responses are in a contingent relationship with a stimulus, a large number of related responses which do not have such a relationship, may be influenced by this stimulus. Millenson (1967) has labeled this phenomenon "response induction". By this, he means that all members of a particular response class (i.e., a group of related responses) may be influenced by the manipulation of only a few members of the response class. The definition of a response class includes

the fact that a number of topographically different responses have the same relationship to common controlling stimuli. Therefore, any variable which influences one member may indirectly influence other members. Imitative behavior may be considered such a response class.

Baer, Peterson, and Sherman (1967) present research which supports this notion. They found that retarded children showed an increasing tendency to imitate new behaviors for which they received no training, after having been reinforced for imitating other modeled behaviors. These children had previously shown no tendency to imitate. The subjects later imitated new behaviors in the apparent absence of reinforcement. Further research by the same authors demonstrated that these apparently non-reinforced imitative responses were under indirect reinforcement control. The apparently non-reinforced behaviors were seen to be members of a class of (imitative) behaviors and were maintained by reinforcement to other members of the same class. When reinforcement was withheld for previously reinforced imitative responses, the other non-reinforced imitative responses also weakened. When reinforcement was reintroduced for the previously reinforced responses, the non-reinforced responses also strengthened.

Peterson (1968) taught another group of retarded children to imitate many diverse modeled behaviors. Eventually, new behaviors were imitated correctly upon first presentation by the model. Many of these imitations could be maintained without direct reinforcement, provided that they were distributed among reinforced behaviors. This again supports the response class notion. Many other studies reported similar results (Metz, 1963; Lovaas, Frietas, Nelson, & Wahlen, 1967; Brigham & Sherman, 1968; Burgess,

Burgess, & Esveldt, 1970).

These studies demonstrate that generalized imitative behavior, based upon the response class notion, does indeed occur. Many imitative behaviors which occur in the apparent absence of reinforcement may, in fact, be controlled and maintained by indirect reinforcement. This research also supports Skinner's contention that imitation must first be learned and reinforced before it can generalize and before it can form a response class.

Mowrer (1960) has developed a sensory or affective feedback theory of imitation which tends to conceptualize imitative behavior as a special case of instrumental learning. The distinction is made between two types of imitative learning based upon whether the observer is directly or indirectly reinforced. In the case of indirect reinforcement (Mowrer calls this, vicarious reinforcement$_I$), the model performs a response and the observer is reinforced. There is a contiguous association between the model's behavior and reinforcement to the observer. The observer can later produce self-reinforcement by acting in a manner similar to that of the model. Mowrer feels that this process is based upon generalization principles.

The second type of imitative learning occurs as a result of an observer empathically experiencing the reinforcing consequences of a model's behavior[1]. In this case, the model is directly reinforced and

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[1]Other theorists, e.g., Flanders (1968a) feel that vicarious reinforcement occurs when a model is reinforced for his behavior and an observer empathically experiences the reinforcement.

the observer empathically experiences this reinforcement.

Aronfreed (1968) attempted to elaborate upon Mowrer's theory. Certain affective states in the observer are seen to be associated with certain thoughts or cognitions (templates) representing the model's behavior. In other words, certain images of the model's behavior are associated with certain affective states in the observer. This elaboration of the Affective Feedback Theory of imitation is difficult to test empirically due to the hypothetical nature of the cognitive templates.

There are some studies in the literature which seem to support Mowrer's sensory feedback theory (Bandura & Huston, 1961; Grusec, 1966; Henker, 1964; Mussen & Parker, 1965). Basically, these studies show that imitative behavior may be faciliated by increasing the rewarding qualities of a model and the rewarding consequences of his behavior. However, not all studies support this theory. There is some contradictory evidence based on the fact that the rewarding qualities of a model have specific rather than general effects, which are undoubtedly a function of the type of behavior a model exhibits. Bandura, Grusec, and Menlove (1967a) for example, found that model nurturance only has specific effects upon the matching of his behavior by observers.

Many behaviors are simply not governed by associative affective feedback states (Bandura, 1969a). It seem that cognitive cues have much control over behavior. Bandura (1968) clearly demonstrated that the selection and performance of matching responses is governed to a great extent by anticipated outcomes of behavior based upon consequences that were directly encountered or vicariously experienced. There are,

therefore, other factors besides affective or sensory feedback which govern imitative behavior. These theories do not explain how matching or imitative behavior is acquired when reinforcement is not given to either the model or the observer. Also, many responses which are acquired through imitative learning have little or no affective valence (Sheffield & Maccoby, 1961). Bandura (1969a) feels that affective stimuli should be considered a facilitative, rather than a necessary condition for imitation.

Several contiguity-mediational theories have been proposed by Bandura (1962, 1965a) and Sheffield (1961). These theories attempt to account for the fact that an observer can observe a model's behavior and acquire the appropriate novel responses and yet perform no overt behavior himself. Learning is purely observational or covert and is called no-trial learning by Bandura (1965a). The observer does not perform any overt behaviors, although several observational trials may be necessary in order to fully reproduce the model's behavior.

Mediational theories assign a prominant role to representational mediators (thoughts) that are acquired on the basis of a contiguity learning process. According to Bandura (1969a, p. 133):

> "...observational learning involves two representational systems -- an 'imaginal' and a 'verbal' one. After modeling stimuli have been coded into images or words for memory representation, they function as mediators for subsequent retrieval and reproduction.
>
> Imagery formation is assumed to occur through a process of sensory conditioning. That is, during the period of exposure, modeling stimuli elicit in observers perceptual responses that become sequentially associated and centrally integrated on the basis of temporal contiguity of stimulation."

In other words, a model's behavior elicits certain perceptual responses or thoughts in an observer. These memory representations of the model's

behavior function as mediators and cues for subsequent (imitative) behavior on behalf of the observer. Bandura goes on to say that the verbal coding of observed events also functions to regulate behavior. A model's behavior can, therefore, be observed by a person and be verbally and symbolically coded such that it can be later reproduced.

This explanation compliments Skinner's analysis of modeling processes. Skinner feels that an individual is not born with the automatic propensity to imitate. Imitative or copying responses must first be learned through a process of selective reinforcement. The cognitive phenomena described by Bandura are complex processes which derive from the basic processes described by Skinner. In the author's opinion, Bandura's theory may be regarded as a sophisticated elaboration of Skinner's basic analysis. To date, this theoretical model seems to best fit the data.

Evidence which supports Bandura's theory of symbolic coding is furnished in a study by Gerst (1969). Subjects were required to observe a filmed model who performed a graded series of tasks with respect to complexity. Subjects were required to code items according to either vivid images, concrete verbal descriptions of the responses, or summary labels of the behavior. A fourth (control) group did not have the opportunity to use mediational devices. All three coding operations facilitated observational learning with concise labeling and imaginal codes being the most effective for aiding in the immediate reproduction of the model's beahvior. Other studies also support this theory (Bandura, Grusec, & Menlove, 1966).

Bandura's scheme, incidentally, also elaborates upon the concept of generalized imitation. Representational mediators may be the factors which tie in the various members of a response class. Copying behaviors are all labeled as being similar or related. These behaviors have in the past produced reinforcement, and are cognitively represented as such. New modeled behaviors are often acquired and performed in the absence of direct external reinforcement, perhaps with the expectation of reinforcement, and also perhaps because reinforcement now occurs cognitively. In other words, imitation per se is reinforcing.

Gerwitz and Stingle (1968) have presented a simplistic explanation of generalized imitation. Like Skinner, they feel that imitative responses must first occur by chance, or through direct training and shaping procedures. These responses are strengthened by direct reinforcement. A class of functionally equivalent behaviors is acquired and maintained by extrinsic reinforcement on an intermittent sched ule. In other words, the class of imitative behaviors is developed like any other class. Gerwitz and Stingle, like Baer and Sherman, feel that only some class members must be reinforced, for others to occur. They also feel that theories of imitation which assume intrinsic reinforcement (e.g., Mowrer's theory and perhaps Bandura's theory) can be explained by this theory of extrinsic reinforcement. The only requirement, therefore, for the maintenance of a broad class of imitative behaviors, is the occasional reinforcement of some class members; a requirement readily satisfied in the natural environment.

The matching-to-sample discrimination learning paradigm is an analogy for Gerwitz and Stingle's explanation and will perhaps clarify the

issue. A subject is required, on each trial, to respond to the stimulus in an array of stimuli, which is most similar to a standard stimulus. If the subject is reinforced for matching behavior, this response class is strenghthened and generalizes to other tasks.

In the author's opinion, Gerwitz and Stingle's account of generalized imitation is too simplistic. Many cognitive factors are ignored. Simple S-R analyses of behavior are inadequate explanations because they fail to account for much data. Cognitive processes are influential in determining the type and extent of imitative behavior in observers and must be accounted for.

The controversies pertaining to modeling phenomena deal with what are the necessary and sufficient conditions for observational learning and performance to occur. In most cases, at least under naturalistic conditions, the behavior exhibited by a model is acquired by an observer in the absence of direct and immediate reinforcement. Many theories assume that some type of internal or self-reinforcement occurs (Bandura, 1969a). Most studies show that generalized imitative behaviors are under some type of incentive control, rather than being inherently reinforcing (Bandura, 1969a). Many of these studies will be dealt with in the next section, which is a discussion and a review of the variables involved in modeling and observational learning. The purpose of this review is to sample some of the research in the area of modeling and to acquaint the reader with some of the basic processes involved in the phenomenon. Due to the great amount of research in this area, most of the studies will be dealt with briefly and in a superficial manner. However, some of what

are considered to be the more important studies will be described in greater detail.

Processes which Underlie Imitative Learning and Behavior

Many processes appear to be involved in the complex phenomenon of imitative or observational learning. This section will deal with some of the most important processes, many of which are described by Bandura (1969a), which underlie observational learning, as well as with some of the variables which influence imitative behavior.

A distinction will be made between learning or acquisition and performance. During acquisition, the observer merely acquires new responses in his behavior repertoire. Performance, which is the utilization of such responses, does not necessarily have to occur during the acquisition process. An attempt will be made to maintain this distinction.

1) Attentional Processes

One process which is involved in observational learning (i.e., acquisition) is that of attention. It seems that simply exposing an individual to a model does not guarantee that observational learning will occur. The observer must attend to and recognize certain aspects of a model's behavior before learning can occur (Bandura, 1969a).

The purpose of a study by Grusec and Mischel (1966) was to determine the extent to which a model's power of control over observers affects the learning of his behavior by the observers. Results indicate that power of control over observers is an influential variable. Child-

ren who interacted with a model who had control over their future resources, were able to recall more of that model's behavior than were children who interacted with a model who had no control over their future resources.

Previous investigations of this nature (Bandura & Huston, 1961; Mischel & Grusec, 1966) which varied a model's attributes, etc., did not differentiate between whether observers really learned a model's behavior or whether they were just more willing to perform the behavior. The study by Grusec and Mischel does suggest that a model's characteristics or attributes do influence which of his behaviors are learned, and not merely an observer's willingness to perform. It is also quite possible that model's who have control over an observer's resources also have more control over an observer's attention than a neutral model.

Many other variables seem to influence what an observer will attend to. Observer attention appears to be positively influenced by a model's status, competence, and expertise (Gelfand, 1962; Mausner, 1954; Mausner & Bloch, 1957; Mausner, 1953; Rosenbaum & Tucker, 1962). Models who possess status symbols (lefkowitz, Blake, & Mouton, 1955) also influence attending behavior. Generally, higher status models seem to control more observer attention than lower status models. Other factors such as age (Bandura & Kupers, 1964; Hicks, 1965; Jakubczak & Walters, 1959), sex (Maccoby & Wilson, 1957; Ofstad, 1957; Rosenblith, 1959, 1961), social power (Mischel & Grusec, 1966), and ethnic status (Epstein, 1966) also influence the degree to which a model's behavior will be attended.

It also seems, that under identical conditions, some people are more able to attend than others. This appears to be a function of