

THE UNIVERSITY OF MANITOBA

THE EFFECTS OF SYSTEMATIC EXTINCTION
AND ADDITIONAL CUES ON GENERALIZED
IMITATION OF RETARDED CHILDREN

by

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ABSTRACT

This study consisted of two experiments and several experimental probes designed to examine possible controlling variables in generalized imitation. Six experimentally naive mentally retarded boys served as subjects. Imitative responses were gross motor responses.

Experiment I was designed to investigate the intermittent reinforcement hypothesis of generalized imitation by systematically decreasing the density of reinforcement for imitative responding from reinforcement for 8/10 imitative responses to complete extinction over 5 experimental conditions. Experiment II also varied reinforcement density from continuous reinforcement for 8/10 responses to extinction for all responses over 6 experimental conditions. In addition, Experiment II attempted to investigate the failure to discriminate hypothesis by pairing a stimulus light with responses undergoing extinction in the experimental conditions.

Results indicated some support, though tentative, for the intermittent reinforcement hypothesis. Although no subjects indicated differential responding in the presence of the stimulus light and thus all failed to discriminate reinforced from non-reinforced responses it was not felt that this result was supportive of the failure to discriminate hypothesis in that subjects continued to respond correctly at high rates over several hundred trials when all responses were on extinction. A more viable explanation for these results would seem to be offered by the social control hypothesis in terms of experimental history and experimenter effects.

A series of experimental probes were conducted with five of the subjects after they had completed Experiment I and Experiment II to further investigate controlling variables in generalized imitation. These probes consisted of instructions not to imitate, a verbal punisher and continued extinction contingencies for imitation^{ve} responding. Results of the experimental probes were generally consistent within subjects but varied somewhat across subjects. The social control hypothesis again offered the best explanation for these results.

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CHAPTER I

INTRODUCTION

Imitation refers to the production of a response by an observer which is topographically similar to that of a model and follows the model's response closely in time. Recent psychological literature on imitative behavior has been very broad and imitation has been the subject of several review papers which have examined the phenomena of imitation as it has been interpreted by various learning theories (Bandura, 1969a; Bandura & Walters, 1963; Gewirtz & Stingle, 1968; Flanders, 1969; Mercer & Algozzini, 1977; Mowrer, 1950). Imitation is considered to be an important concept in the area of child development with particular relevance to the areas of language acquisition (Bricker & Bricker, 1974; Guess & Baer, 1973b; Guess, Sailor, & Baer, 1974; Holdgrafer, 1975; Lutzker & Sherman, 1974; Sherman, 1971; Slobin, 1968) and the development of social behaviors such as aggression (Bandura, 1973), identification (Gewirtz & Stingle, 1968), and moral judgements (Bandura, 1969b).

Although the importance of imitation to development is conceded by most researchers, the nature and establishment of imitative behavior is not fully understood and has recently been the subject of intensive experimental activity. The present understanding of imitative processes has developed gradually over the years as the result of prominent learning theorists' interpretations of imitation in both laboratory and natural settings.

Early Learning Theory

Bandura (1969a) traces imitation as far back as Morgan and McDougall in the late nineteenth century. Their interpretation of

imitation was in terms of an instinctive framework which Bandura felt discouraged empirical investigations for several years. As instinct theory became less popular, imitation was accounted for from a Contiguity Theory model. Bandura, in interpreting the writings of Humphrey (1921) and Holt (1931) suggests that these authors felt that imitative behavior could be explained in terms of the "temporal contiguity between modelling stimuli and the imitator's matching response" (Bandura, 1969a, p.121.).

Miller and Dollard (1941) reported a series of studies investigating what they labelled as matched-dependent behavior. Matched-dependent behavior served to describe those situations where an individual would match exactly the behavior of a "more intelligent associate" for the specific purpose of obtaining the rewards the behavior of the associate or model had gained. Miller and Dollard emphasized the similarity between matched-dependent behavior and imitation and experimentally investigated this behavior. They devised a series of two choice discrimination tasks in which an observing child watched as an adult went to one of two boxes located in opposite corners of an empty room and deposited a candy treat in a randomly chosen box. The children accurately "matched" the adult's behavior and reliably retrieved the bits of candy. Additional experimentation examined various stimuli that were thought to be important variables in matched-dependent behavior. Miller and Dollard's analysis was in terms of a Hullian drive-reduction framework. Imitative learning involved drive (the subject wants something), cues (the subject notices something), responses (what the subject does), and rewards (what the subject gets).

Mowrer (1960) was in agreement with the Miller and Dollard model and expanded on it to include the concept of secondary reinforcement. Mowrer illustrated his theory using a talking bird as an exemplar. The model "makes a particular noise and the bird gets fed, water, or in some other way rewarded. The result is inevitable: the stimulus consequences of (the model's) action, as they impinge on the bird, take on secondary reinforcement, and the bird when properly motivated, tries to recreate them -- in short, 'imitates.' This, when one thinks of it, is a remarkable phenomenon: what is at first a stimulus produces a response which reproduces that stimulus" (1960, p. 112). Mowrer argued that secondary reinforcement was able to account for the motivation of the subject to imitate in both immediate and delayed situations whereas Miller and Dollard's (1941) explanation could not account for delayed imitation in the absence of either the modelled behavior or extrinsic reinforcement.

Social Learning Theory

With the exception of Miller and Dollard's work, imitation was relatively unexplored in the laboratory until the early 1960's. Bandura and his colleagues (Bandura, Ross & Ross, 1961, 1963a, 1963b) demonstrated and defined many of the variables operating in imitation.

Most of the studies conducted by this group followed fairly similar procedures. The subject, usually a young child, was exposed to some initial treatment (e.g., watching a movie in which confederate performed specific acts) after which some other variable was manipulated (e.g., mildly frustrating the child), and finally the child's degree of imitation was measured in a situation similar to the one in the first phase (ie. the child was introduced to the situation viewed in

the movie). Age, sex, and prestige of the model variables were demonstrated to be important (Bandura 1969a).

Bandura defined the acquisition process of imitation as "observational learning" which occurred through stimulus contiguity and mediational processes. He further explained the maintenance of imitative behavior through "vicarious reinforcement" which denotes an individual experiencing reinforcement by observing another individual being reinforced. Vicarious reinforcement was hypothesized to take place by both stimulus contiguity and symbolic mediation, both central to Bandura's theory.

Imitation in Operant Conditioning

An operant conditioning analysis of imitation (Baer & Sherman, 1964; Skinner, 1953), has attempted to explain imitation using only conditioning principles and in addition arguing that the addition of the terms "observational learning" and "vicarious" reinforcement were unnecessary. Research on imitation in the operant model has led to the introduction of an alternative methodological approach to the experimental investigation of imitation. Central to this approach is an avoidance of organized theory and a concentration upon simple stimulus-response functional relations derived from single subject research designs (Baer, Wolf & Risley, 1968; Hersen & Barlow, 1976; Sidman, 1960) in which subjects are studied under highly controlled experimental conditions.

The research paradigm employed in operant experimentation is known as "generalized imitation".

CHAPTER II

REVIEW OF THE LITERATURE

Generalized imitation from an operant conditioning or behavioral analysis point of view has been studied using two experimental paradigms. In one paradigm it has been repeatedly demonstrated that the operant level of behaviors modelled to subjects can be raised to very high rates in the absence of reinforcement (S^A responses) by contingently reinforcing other similar responses (S^D responses) if they are imitated subsequent to the experimenter modelling them (Baer & Sherman, 1964; Bry & Nawas, 1972; Garcia, 1971; Hekka & Freeman, 1978; Marsberg, 1974). A second paradigm focuses on the maintenance of imitative responses already in the subject's repertoire through reinforcement and/or instructions and the addition of other responses (generalized imitative responses) which are never reinforced (Brigham & Sherman, 1968; Peterson & Whitehurst, 1971; Steinman, 1970a).

The strategy followed is to manipulate instructional and/or reinforcement components in order to decrease the usually high rates of imitation typically obtained in both of these models. Experimental results obtained by controlling these sets of independent variables and analyzing subsequent response rates have led to the formation of several hypotheses concerning the control of generalized imitation. This review will examine the four major hypotheses that have developed from an operant conditioning frame-work by emphasizing the data supportive of each of the four major positions.

Behavioral Similarity to the Model Hypothesis

Generalized imitation was first described by Baer and Sherman (1964). In this experiment eleven young children served as subjects. Children were seen individually in an experimental situation in which each subject was seated in front of a small stage. A hand puppet was located on the stage and a speaker through which the experimenter could communicate was located within the stage. Both the subject and the puppet had a bar pressing apparatus in front of them. In the experimental phase subjects were socially reinforced by the puppet if they imitated the puppet's behaviors of mouthing, head nodding, and saying unusual verbal statements. The generalized imitative response in this experiment was bar pressing and subjects were never reinforced for imitating this behavior.

Results indicated that although all subjects imitated the reinforced behaviors only seven of the subjects reliably produced the bar pressing response. Baer and Sherman were also able to demonstrate a reduction to operant level of imitative responding under conditions of extinction and time out (T0).

Baer, Peterson, and Sherman (1967) replicated these findings utilizing an adult experimenter and three mentally retarded children who had no prior imitative skills. This experiment consisted of three phases in which imitative behavior was trained, correct imitative behavior was reinforced and generalized imitative responses were introduced. In the generalized imitative response phase the subjects produced ratios of reinforced to unreinforced responses ranging from 8:1 to 125:5.

Baer and his associates explained these results in terms of a conditioned reinforcement hypothesis. This hypothesis argues that behavioral similarity to a model immediately prior to external reinforcement becomes a discriminative stimulus for reinforcement on subsequent trials. The "similarity to a model" stimulus via pairings with positive reinforcement develops conditioned reinforcement properties of its own and can maintain imitative responses not followed by reinforcement.

Brigham and Sherman (1968) used the behavioral similarity to a model hypothesis to account for the results they obtained with three 4 year old boys. Subjects in this study had either English or Russian words modelled for them by an experimenter. Imitating English words resulted in positive reinforcement while the imitation of Russian words (generalized imitative responses) were never reinforced. Imitation of Russian words correlated highly with the imitation of English words in all phases of this experiment.

Brigham and Sherman (1968) suggested that "Since vocal matching (similar auditory stimuli) preceded and was discriminative for reinforcement, it may have become a conditioned reinforcer." (p. 158)

The Brigham and Sherman (1968) study was based on a study conducted by Lovass, Berberich, Perloff and Schaeffer (1966) in which two autistic children were reinforced for the imitation of English words but not for imitating Norwegian words. Lovass et al. explained the imitation of Norwegian words on the basis of conditioned reinforcement.

Further support of the behavioral similarity to a model hypothesis has been offered by Parton and Fouts (1969). Similarity of colors was

demonstrated to be an effective conditioned reinforcer for the children in this study which employed a Matching to Sample procedure. In a subsequent study Parton (1970) further investigated the behavioral similarity to a model hypothesis using the same experimental setting and apparatus as the Baer and Sherman (1964) study. The results of this study indicated that generalized imitation occurred in only 19 out of 100 kindergarten children. Furthermore, imitative responses decreased as the experimental session progressed. Since it would be expected that the reinforcing properties of similarity to the model should increase over trials as should the frequency of imitation this evidence would seem to be negative as far as the Baer et al. (1967) hypothesis is concerned. However, these results may have been due to the experimental design used in this study. Unlike the Baer and Sherman (1964) single-subject methodology in which only 11 children were employed for up to seven sessions Parton used a repeated measures group design in which only one session was required for each of the 100 subjects.

Steinman (1970a) has criticized the conditioned reinforcement explanation of generalized imitation. He argues that if differential reinforcement in other operant situations develops stimulus control then it should also develop stimulus control for generalized imitations. Conversely if the response produced stimuli in the generalized imitation paradigm act as conditioned reinforcers then why do the response produced stimuli in all operant situations not act as conditioned reinforcers.

In an experiment with a 12 year old retarded girl Peterson (1968) obtained results which also question the validity of behavioral similarity to a model as an explanation for generalized imitation. In one

condition of this study the subject was taught a set of non-imitative responses as well as a set of imitative responses. The non-imitative responses were controlled by the experimenter through discriminative stimuli. These non-imitative responses were non-reinforced but were maintained when interspersed among reinforced imitations. Under extinction all responses decreased, "indicating that reinforcement was necessary to maintain the response-class organization, but not confirming an essential role for 'similarity' as such" (p. 225).

Although the behavioral similarity to a model hypothesis seemed to be a reasonable explanation of generalized imitation when first discussed by Baer et al. (1967) it has failed to stand up to empirical investigation as the result of studies such as Peterson (1968) and Parton (1970), and presently is discussed in the literature more from a historical perspective than a viable explanation.

Failure to Discriminate Hypothesis

Bandura has offered an alternative explanation for the generalized imitation phenomena (Bandura 1968, 1969 a b; Bandura & Barab, 1971). Imitation for Bandura (1968) is a product of observational learning. As a result of the observational learning process symbolic representations of modelled behavior are established. Performance of the imitative response is reinforced by vicarious reinforcement, direct reinforcement or self-administered internal reinforcement.

Bandura (1969 a) discounts the conditioned reinforcement explanation of generalized imitation stating that rather than similarity to a model being the primary dimension of reinforcement it was the utilitarian value of the behavior that maintained imitation. He explained general-

ized imitation as a failure by the observer to discriminate reinforced from non-reinforced responses. In the imitation paradigm all responses, both reinforced and non-reinforced, differ in many of their stimulus characteristics but also have many similar characteristics. Because the situation is complex the observer simply cannot discriminate the reinforced from the non-reinforced behaviors. Bandura predicted that over trials a discrimination between the reinforced and non-reinforced trials would be acquired resulting in a reduction in generalized imitative behavior, rather than an increase in generalized imitative behavior as would be predicted from the conditioned reinforcement explanation.

In the Parton (1970) study discussed above some subjects did in fact reduce generalized imitative responding as the study progressed. This offered support for the discrimination hypothesis as a result of the procedure which may have facilitated discrimination. This procedure specified blocks of three trials (two reinforced responses and one non-reinforced) separated by 20 seconds of puppet interaction.

Steinman (1970a) investigated the discrimination hypothesis using a novel procedure which involved "choice trials". The usual procedure followed in studies on generalized imitation was to present subjects with the instruction "do this", after which the experimenter modelled a behavior which was followed by the subject's response. This procedure was repeated on each trial. Steinman's innovation involved training subjects initially with this type of "single presentation trial procedure" then to provide the subject with a choice of imitations on each trial. Subjects on each trial of this procedure had a choice of imitating

one S^D response or one S^A response modelled by the experimenter. Steinman's rationale was that a choice of responses on each trial would facilitate discrimination for subjects and differential responding should result with S^D responses being imitated more frequently. Steinman's investigation was comprised of three experiments.

In the first experiment blocks of single presentation trials were alternated with blocks of 10 choice trials twice each session. In the first six sessions only S^D responses were used in both types of trials. S^A responses were introduced to both types of trials during the seventh session. Both subjects imitated both types of responses during single presentation trials. The results were conflicting for the choice trial procedure as one subject reliably showed differential responding as predicted while the other subject generated a response pattern in which the most recently modelled response was imitated regardless of its consequences.

In the second experiment Steinman tested the discrimination hypothesis by manipulating discrimination difficulty. In this procedure half of the S^A responses were similar to the S^D responses in that they involved imitating gross motor movements of the hands. The other half of the S^A responses were of low discriminability involving imitation of foot movements. The results of the previous experiment were replicated as all four subjects imitated both S^D and S^A responses on the single presentation trials. On choice trials more of the high discrimination difficulty S^D responses were imitated than low difficulty S^A imitative responses. This data suggests at least qualified support for the discrimination hypothesis.

In the third experiment Steinman investigated another variable of discrimination by manipulating instructions given to subjects preceding experimental sessions. In the first three sessions subjects were told not to do the imitations they didn't get a bead for. Before sessions 4, 5, and 6 they were told that it didn't matter if they didn't do the imitations they didn't get a bead for. The instructions for sessions 7, 8, and 9 were the same as those given for the first three sessions. In session ten the subjects were asked to watch the experimenter perform a behavior and then state whether or not they had previously received a bead for performing that response.

The results of this experiment indicated that instructions were effective in altering the performance of imitations. Sessions preceded with the first instruction resulted in a decrease in S^A responses. The degree of difficulty of the discrimination was also evident in the results of this experiment. On trials involving a choice, three of the four subjects never imitated the unreinforced imitations that were highly discriminable with a less pronounced effect with less discriminable responses. The results were relatively the same on single presentation trials. Sessions preceded by the second instruction resulted in data which was relatively the same as that reported for the second experiment. The results of the session in which subjects were asked to identify verbally which responses were reinforced and which were not, were consistent with subjects performance in the previous nine sessions. The three subjects who showed differential performance were consistently able to verbally label those responses which were followed by reinforcement and those which were not. The results of these experi-

ments support the failure to discriminate hypothesis under conditions of low discriminability between S^D and S^A responses, and with greater support using a "choice trial" procedure than a "single presentation trial" procedure.

A further study by Steinman (1970 b) replicated and extended the findings of the above study. Using the same procedures of single presentation trials and choice procedures Steinman again varied instructions which preceded the experimental session but in addition employed two experimenters. One experimenter was always associated with S^D responses and one was always paired with S^A responses. Six girls between the ages of seven and nine served as subjects. During single presentation trials the appropriate experimenter entered the session room, ran a trial and then left the room immediately following the trial. After five seconds either the same or the second experimenter, depending on the type of trial, entered the room to initiate the next trial. On choice trials both experimenters remained in the session room seated in front of the subject. Initiation of a trial involved one experimenter saying "Do this" and modelling a response. The second experimenter gave the same instruction and modelled a response immediately following the modelled response by the first experimenter.

The results showed that the subjects modelled all responses on single-presentation trials but discriminated S^D from S^A responses on choice trials. When instructed not to perform imitations for which they didn't get a bead all subjects stopped imitating S^A responses. Although the results suggest that subjects were able to discriminate S^D from S^A responses under certain conditions Steinman also suggested that further

research on generalized imitation might investigate social setting events as a factor responsible for generalized imitation. This suggestion was based on Steinman's observations of the influence of the model in the experimental setting. The model provides instructions and consequences to the subject and "demands" a certain amount of compliance from the subject.

Steinman and Boyce (1971) tested the failure to discriminate hypothesis using essentially the same procedures previously described (Steinman, 1970 a b). The four 5 year old girls who served as subjects demonstrated discrimination only on choice trials. A novel manipulation in this study was to reverse the reinforcement contingencies in one phase such that previously non-reinforced imitations received reinforcement and reinforced imitations did not. On choice-trials subjects continued to discriminate correctly but on single-presentation-trials responding was not affected as all subjects continued to imitate all responses whether reinforced or not.

Although these results again indicate qualified support for the failure to discriminate hypothesis the authors have suggested that generalized imitation may be more a function of the procedures employed than a failure to discriminate.

Bufford (1971) tested the failure to discriminate hypothesis in a systematic replication of Steinman (1970a; 1970b). Monosyllabic English and German nouns were reinforced or not reinforced respectively if imitated. The number of S^D responses was systematically decreased from 20 to 1 while the number of S^A responses remained constant at 10. Bufford's hypothesis was that as the number of reinforced responses

presented decreased the ease of discrimination should increase and if the failure to discriminate hypothesis was correct the number of imitations of the German nouns should decrease. In 55 single presentation trial sessions and two subsequent sessions of choice trials no differential responding was observed in the subjects. Thus Steinman's findings were not replicated although highly discriminable responses were used.

In a second experiment instructions were manipulated as subjects were told not to "verbally" imitate those words for which they were not reinforced. Differential responding occurred which supports Steinman (1970a) but which again fails to support the failure to discriminate hypothesis.

Using the subjects from the first experiment and the procedure of the second experiment Bufford examined the interaction of long experimental histories with instructions not to respond. Instructions resulted in a reduction of responses on S^A trials but not nearly as dramatic as the results of experiment two. This result would suggest that instructional control may decrease as subjects generalized imitative history increases.

Sherman, Saunders, and Brigham (1970) demonstrated that generalized matching and generalized mismatching behavior could be developed using procedures similar to procedures used in imitation studies. Subjects reinforced for matching several sample stimuli reliably matched probe stimuli in the absence of reinforcement. Other subjects who were reinforced for mismatching sample stimuli also consistently mismatched novel samples in the absence of reinforcement.

Saunders and Sherman (1974) attempted to test the failure to discriminate hypothesis by replicating Steinman (1970a) using a match to sample procedure. Three moderately retarded adolescents served as subjects in this experiment. Consistent with Steinman's results subjects demonstrated no differential responding on single-presentation trials, but showed a preference for reinforced responses on choice trials although they continued to respond to some probe samples never associated with reinforcement. In the final condition of this experiment when single-presentation trials were reinstated subjects again responded to stimuli which they had discriminated on previous choice trials.

In all of the studies which have attempted to evaluate the failure to discriminate hypothesis three results have been consistent:

1. When given a choice of which response to imitate subjects are able to make appropriate discriminations and show differential responding in favor of those imitations which produce reinforcement.
2. Subjects have not reliably demonstrated that they are able to discriminate reinforced from non-reinforced responses on single-presentation trials even when the discriminability of reinforced and non-reinforced responses is facilitated.
3. Subjects are reliably able to make discriminations when instructed not to respond to those responses that do not produce reinforcement if imitated.