Establishing imitative behavior and stimulus control in retarded children using peer trainers: a thesis...

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Establishing Imitative Behavior
and Stimulus Control
in Retarded Children Using Peer Trainers

A Thesis
Presented to
The Graduate Faculty
of the
Department of Psychology
at the
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In Partial Fulfillment
of the Requirements of the Degree
Master of Arts

Judith A. Viventi
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This thesis, written and submitted by

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on Graduate Studies, University of the Pacific.

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[Signature]

Dated 7/30/76
To the four mentally retarded children -----
in the Child Development Program at Stockton State Facility -----
and institutionalized children everywhere. Without them there would be little understanding of learning.

To my friends, the Hovells.
And to my parents.
Acknowledgements

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Abstract

Two severely retarded children were trained to serve as imitative learning trainers for two profoundly retarded children. Initially, one trainer reinforced the correct imitations of one trainee but not the other. A second trainer reinforced the correct imitations of a second trainee but not the first trainee. A multiple baseline comparison revealed that initial training produced high rates of imitative responding to both the reinforcing and non-reinforcing trainers. Generalization of imitative responding to both trainers in a new setting was also demonstrated. Stimulus control of imitative responding was achieved when the reinforcing and non-reinforcing trainers for each trainee reversed those roles. Imitative responding to both trainers was recovered when both trainers reinforced trainees' correct imitations. This study demonstrated the effectiveness of peers as imitative behavior trainers for retarded children, and generalization of imitative responding across settings and trainers.
Establishing Imitative Behavior and Stimulus Control in Retarded Children Using Peer Trainers

Many mentally retarded children, especially those severely or profoundly retarded, display a low frequency of imitative behavior. Because imitative behavior is a critical component in children's intellectual and social learning (Burgess & Burgess, 1970) there have been several recent studies of the variables influencing acquisition and generalization of imitative behavior in retarded children.

Baer, Peterson and Sherman (1967) taught three severely and profoundly retarded children, who were without spontaneous vocal or motor imitative behaviors, to imitate the responses presented by a model. The procedure that they developed and used to train their subjects has been called an "imitation procedure." In that procedure, an experimenter verbalized the instruction "Do this" and modeled a specific response in view of the child. Each of the child's correct imitative responses was reinforced with edibles and social praise. If the child failed to imitate, he/she was "put through" the response (Konorski & Miller, 1937). "Putting through" consisted of physically assisting the child in the completion of the response and reinforcing that completion. Putting through was gradually "faded" (Terrace, 1963(a), 1963(b)) from the training by slowly removing the physical prompt until the response could be performed without any assistance.
Using the procedures just described, Baer, Peterson, and Sherman (1967) successfully taught the children to imitate more than 100 responses presented by a model. The authors noted that fewer training trials were required to establish imitative responses that were introduced later in the training sequence. They also found that the children imitated new untrained responses as long as some trained responses were being reinforced. When the experimenter withdrew reinforcement, both previously reinforced and non-reinforced imitations declined. When the experimenter reintroduced reinforcement, all behaviors, including untrained responses returned to their previous high levels. This phenomenon was termed "generalized imitation" by Baer and Sherman (1964). Baer, Peterson and Sherman (1967) suggested that the similarity of the model's responses to the responses of the children facilitated this generalization. The authors also noted that following the training and testing done in the experiment, an initial verbal repertoire was established for two of the subjects. The authors stated that the training of the verbal repertoire proceeded more rapidly, and suggested that the initial imitation training facilitated the subjects' more rapid acquisition of verbal responses.

Brigham and Sherman (1968) replicated and extended the finding of Baer et al. (1967), investigating the extent to which imitative procedures could be used to train verbal responses of preschool children. A model presented English words to three children and asked them to repeat these words.
Each accurate imitation of the model's response was reinforced. The model also presented novel Russian words but the children's imitations of these words were never reinforced. The children imitated both the English and Russian verbal responses, as long as reinforcement was provided for the English responses. When reinforcement was not provided for either type of response, accuracy of imitating both the English and Russian words decreased, lending support to the finding of Baer et al. (1967) on "generalized imitation."

Whitman, Mercurio, and Caponagri (1970) investigated the effectiveness of imitation procedures in teaching social responses to two severely retarded children. A model demonstrated to two children how to roll a ball and pass a block to another model. The model then commanded the children to imitate those responses. The experimenter reinforced the children after both completed a response, i.e., one child rolled the ball to the second child and the second child returned the ball. The model "put the children through" the first response, and the children simply imitated the model's second response. The experimenter also measured another social interaction, defined as two children coloring in the same coloring book, before and during treatment. The children's coloring together decreased during baseline and increased during treatment. These results tend to support and confirm the findings of Baer et al. (1967) and Brigham and Sherman (1968), that reinforcing some imitative responses also serves to maintain other non-reinforced responses.
Shumaker and Sherman (1970) used procedures similar to those of Baer et al. (1967) to train three retarded children to produce past and present tense forms of verbs in response to the model's verbal requests. The experimenter held up a picture and said to the child, for example, "This boy is fishing. He did the same thing yesterday. What did he do yesterday? Yesterday----?" If the subject correctly responded by saying, "Yesterday he fished," he/she was reinforced with edibles and social praise. If the subject failed to respond correctly the experimenter verbally modeled the correct response. The subject was reinforced if he/she correctly imitated this second presentation of the stimuli. Incorrect responses were followed by "No, that's wrong" and a five-second period of silence, after which the same stimuli were again presented. After a criterion number of verb tenses were learned, probe sessions were introduced. In the probe sessions, cues for verbs for which there had been no training were presented. Reinforcement was not delivered for correct responses to untrained verbs. These probe sessions were interspersed with sessions in which correct verb responses were reinforced. Subjects imitated untrained verb responses as long as some verb responses were being reinforced. These authors suggest that their findings demonstrate that the correct use of past and present tense forms of verbs can be taught to retarded children through the use of imitation and differential reinforcement of correct and incorrect responses.
Garcia, Guess, and Byrnes (1973) trained a severely retarded girl, initially lacking sentence form responses, to use singular and plural sentence forms. The experimenter displayed an object visible to both a model and the subject and said to the model, "What do you see?" After a response from the model, the experimenter asked the same question of the subject. The correct response was "That is one (item)." Correct responses by the subject were reinforced with sweets and social praise. The same procedures were used to train identification of plural items. After a number of responses were trained, the subject identified new items by imitating the model, even though these identifications were not reinforced. These results are consistent with findings of Baer et al. (1967), Baer and Sherman (1964), and Shumaker and Sherman (1970).

Lutzker and Sherman (1973) "systematically replicated and extended" the findings of Shumaker and Sherman (1970). They trained three retarded and two developmentally normal toddlers to use correct verb form sentences, using imitation and reinforcement procedures similar to those used by Shumaker and Sherman (1970). Pretesting showed that the children could not produce full sentences with correct subject-verb agreement. After pretesting, the children were then taught to label noun-subjects correctly as plural or singular, and to verbalize the correct auxiliary verb associated with the verb form of the sentence. Posttesting revealed that the children were still unable to produce sentences with the
correct verb forms. Those results demonstrated, however, that the children's failure to produce full sentences with correct subject-verb agreement was not because they lacked the specific vocabulary components involved. The experimenter then taught the children the verb forms that combined with subject nouns and auxiliary verbs to produce complete sentences. For example, the experimenter displayed a picture to the child that contained a singular subject, i.e., "a cow running." The experimenter would ask the child, "What's happening?" If the correct singular verb was produced, e.g., "The cow is running," a token and praise were delivered. If the child answered incorrectly, the experimenter "turned his face away" for five seconds, presented the picture again, modeled the correct response, and again asked the child, "What's happening?" The experimenter then delivered a reinforcer if the correct response was modeled. These procedures were continued until the children correctly produced five consecutive sentences without a model. Earned tokens could then be exchanged for edibles. Correct plural verb forms were taught in the same way. Training sessions were followed by probing sessions in which two sets of pictures were randomly presented. One set contained pictures by which a correct sentence response had been trained and the other a number of pictures (some singular, some plural) to which correct responses had not been trained. Both the retarded and normal children in the study had learned to produce full sentences with correct subject-verb
agreement to both training and probe pictures. The authors concluded that imitation training procedures and reinforcement are important in training normal and retarded children in the production of generative language forms (i.e., full sentences with correct subject-verb agreement).

Wiesberg, Passman and Russell (1973) replicated the use of the imitation procedure of Baer et al. (1967) to teach two retarded adolescents imitation of a response that was in contrast to bizarre hand gesturing. The model displayed a food reinforcer and then modeled arm-raising while saying, "Do this." If the subject imitated this response, which was incompatible with bizarre hand gestures, he was reinforced with goodies and social reinforcers. Failure to respond correctly led to non-reinforcement and turning of the experimenter's head away from the subject. Both adolescents learned to imitate arm-raising. Further, bizarre hand gesturing was eliminated for both adolescents in the training setting.

Peterson (1968) investigated the suggestion of Baer et al. (1967) that the phenomenon of generalized imitation was based upon responses of the subject being similar to responses of the model. Peterson trained a severely retarded 12-year old girl who had participated in the Baer et al. study (1967) to imitate simple motor behaviors. A model said, "Do this," modeled a behavior such as "tap head with hand," and reinforced correct imitative responses. Other behaviors, e.g., "clap hands," within a response class
defined as "imitative behaviors," were imitated as long as some imitative responses in that response class were being reinforced. Peterson also investigated the subject's ability to perform responses that were not duplicates of the model's responses but were cued by the model. For example, the experimenter shaped a response like "shake coffee can" in response to the experimenter's modeled cue "clap hands." The author defined this class of responses to a particular stimulus cue provided by the experimenter as a "non-imitative" class. Once this set of non-imitative responses was shaped, Peterson found that as long as some responses from the imitative class were reinforced, the subjects responded on cue with the correctly defined behavior in the non-imitative response class. When all reinforcement was discontinued, responses in both classes extinguished. It should be noted that in the response class defined as non-imitative there actually had been some imitation of the model's behavior during training, because the experimenter had demonstrated that the appropriate response following the experimenter's hand clap for example was to shake the coffee can.

Garcia, Baer, and Firestone (1971) investigated the extent to which generalized imitative responding to a model's vocal behaviors would be obtained as a result of reinforcing imitations of the model's motor behaviors. They trained four severely retarded children who were non-imitative to imitate a number of small motor responses. The training of small motor responses involved "putting through" and "fading" out
of procedures similar to those described in Baer et al. (1967). Other untrained large motor responses were also presented to the subjects. The subjects imitated the large motor responses as long as some small motor responses were reinforced. When untrained short vocal responses were presented, however, imitation did not generalize even when the subjects were being reinforced for imitating small or large motor responses.

Garcia et al. then attempted to train four of the subjects to emit short words. These subjects uttered sounds, initially, but did not emit verbalizations that qualified as words. The training involved shaping successive approximations of the model's responses. The first step involved reinforcing the subjects for attending to the experimenter's mouth and making any sound at all after the experimenter's vocal presentation. Physical assistance was initially used in forming the subject's mouth to imitate the model's visual cues. Visual cues and physical prompts were gradually faded out. Each response or successive approximation of a response was reinforced. Two of the subjects failed to vocalize the experimenter's vocal responses even after shaping. The other subjects were shaped to imitate the short vocal responses and subsequently imitated untrained long vocal responses as long as some short vocal responses were reinforced. These two subjects also continued to imitate short or long vocal responses when only small or
large motor responses were being reinforced. Alternately, these subjects imitated small or large motor responses as long as the experimenter reinforced some short or long vocal responses.

It must be noted that, in this study, when the subject's response repertoire was initially deficient, i.e., the subjects had not been trained to vocalize simple words, generalized imitation did not occur, suggesting that generalized imitation may be limited to responses that are already a part of the subject's repertoire.

Martin (1972) attempted to investigate the relative importance of some antecedent and consequential variables present in generalized imitation experiments. He examined the imitative behavior of three retarded boys, who had evidenced some imitative responses before the experiment. The consequences of imitation and the experimenter's instructions to the subjects were changed throughout 13 experimental phases. Twelve simple motor behaviors, eight in Set A and four in Set B were randomly presented by the experimenter during every session. The instructions and the consequences associated with the subjects' responses to Set A behaviors were changed from phase to phase, while imitative responses to Set B behaviors were never reinforced. Set B behaviors were interspersed with Set A behaviors so that generalized imitation could be examined. In Phase A, the experimenter said, "Don't do this," and did not reinforce
imitative responses. In Phase A, all three subjects imitated 15-50% of the modeled responses for at least three sessions. Eventually, all imitative responding dropped to zero.

In Phase B, the experimenter said, "Do this," and reinforced correct imitations. All three subjects imitated both sets of modeled responses on 75-100% of the trials. In Phase C, the instructions were changed to "Don't do this," but imitative responses were reinforced. The percentage of trials on which the subject imitated both sets of modeled responses remained equal to the percentages in Phase B. Phase D was identical to Phase A. During Phase D, the percentage of imitative responses to both Set A and Set B slowly decreased to zero for all three subjects. Phase E procedures were identical to those in Phase B. All subjects imitated the responses in both sets on nearly 100% of the trials. In Phase F, the experimenter said, "Do this," and extinguished correct imitative responses. Two subjects continued to perform at 100% of the trials for both Sets A and B; one subject's percentage of imitative responding to both sets noticeably declined. In Phase G, the experimenter said, "Do this," and provided non-contingent reinforcement, i.e., reinforced any behavior of the subjects occurring immediately following the models' presentation of a trial (DRO - 0 sec.). This procedure led to rapid extinction of both Set A and B behaviors in all three subjects. In Phase H, when DRO was changed to 15 seconds, there was a slight recovery of both Set A and B imitative behaviors; however, after several
sessions, imitation returned to the near-zero level of Phase G. In Phase I, the experimenter said, "Do this," and extinguished imitative responses exactly as in Phase F. During Phase I, the percentages of trials on which subjects responded by imitating the models' behavior increased rapidly to 100% for Set A behaviors and 90% for Set B behaviors. In Phase J, the experimenter said, "Do this," and reinforced correct imitative responses. All subjects imitated both Set A and B behaviors on 80% or more of the trials. Phase K procedures were identical to those in Phase F. All subjects' imitation of both Sets A and B behaviors remained between 80% and 100% of the trials presented by the model. In Phase L, the experimenter said, "Do this," but said "no" if the subjects emitted an imitative response. The percentage of trials on which subjects imitated the modeled behaviors dropped to zero. Phase M was exactly like Phase F, I, and K. During Phase M, all subjects' imitative responding to both Set A and Set B behaviors returned to near the 100% of the trials. The author concludes that neither instructions nor consequences effectively controlled the imitative behavior of the subjects. In Phases C, G, H, and L, when instructions were incongruent with the contingencies of reinforcement, the imitative behavior of all three subjects was controlled by the consequences. During Phases F, I, L, and M, extinction of imitative responding did not affect the rate of correct imitative responses. The author further suggests that it was very difficult to eliminate a well-
established behavior that was under instructional control, indicating that the consequences of imitative behavior, particularly reinforcement, are crucial to the imitation procedure.

Two results consistently emerge from the studies reviewed so far. First, fewer training trials are required to establish imitative responses that are introduced later in a training sequence. Second, imitative responses that have never been reinforced increase in frequency and continue to be emitted when some imitative responses are reinforced. This does not ensure that behaviors learned in one setting will be performed in new settings or with new persons. More recently, investigators have become interested in the transfer of learned imitative responding to new settings and new persons, i.e., stimulus generalization.

Stokes, Baer and Jackson (1974) investigated the transfer of a hand-waving response to four settings and to 20 new persons. The experimenter trained four retarded children to hand wave using the imitation procedures of Baer et al. (1967). The experimenter said, "Hello," modeled a hand-wave response for the subject, and reinforced correct imitative responses with edibles and social praise. Initially the experimenter had to put the subjects through the response. After the training session each day, the experimenter walked the subject through four different areas in each of which a new person would greet the subject with a hello. This new person
did not model, prompt, or provide edible reinforcers for correct hand waves. The model did, however, provide social reinforcement if the subject responded with a hand wave. If the subject's responding did not generalize to the new person encountered on the walk, the subject, experimenter, and new person returned to the training setting, where the subject was trained to respond to the new person. The authors found that at least two and sometimes three new persons had to repeat training before the subject's hand-waving response in the original training setting transferred to new persons in the outside settings.

Rincover and Koegel (1975) investigated the extent to which imitative responses of autistic children trained by one experimenter would transfer to a new experimenter in a new setting. Ten autistic children were taught to perform simple motor behaviors modeled by an experimenter using imitation procedures. The experimenter said, "Do this," modeled a response and reinforced correct imitative responses. A child who did not imitate the model was put through the response and reinforced. When a child correctly imitated the model's responses on 20 consecutive trials, he/she participated in a transfer test. For the transfer test, a new model took the child to a new setting and repeated the above procedure, but did not reinforce correct imitative responses. If a child correctly imitated the modeled responses at least once in ten trials, he/she met the criterion for passing the transfer test. Six of the ten
children passed that test criterion, four did not. Each of these four subjects underwent observation trials, designed to assess which of the many stimuli present during training would elicit an imitative response from the subject. This assessment began by introducing one stimulus from the original training setting into the new environment and conducting another set of 10 transfer test trials. Correct imitative responses were never reinforced in the transfer trials. If a child failed to imitate at least one response correctly, that stimulus was removed and replaced by a different stimulus for a second series of transfer test trials. This procedure was repeated with retests until the child imitated the response on at least one trial of the 10 or until all stimuli, including the original trainer, had been introduced in the new setting. If the child still failed to perform, he/she was returned to the original setting, where the experimenter closely observed the specific behaviors of the trainer during presentations of a response for a child to imitate. These observations were made in an attempt to identify possible behavioral cues that might be controlling the child's imitative responses. For example, one model restrained a child's hand while saying, "Do this," and removed the restraint to allow the child to imitate the response presented. When removal of the hand restraint was introduced to the new setting by the new model, the child correctly imitated the modeled responses presented in the transfer test. Results of the assessment of the four subjects
who did not transfer responding to the new model and setting immediately following training indicate that each one responded to a particular stimulus cue from the original training setting. The first child responded to the removal of a hand restriction as explained above. The second child imitated responses of the new model only after the table and chairs from the original setting were introduced into the new setting. The third child responded only to the original trainer in either setting but never to a new model. The fourth child responded to a specific hand movement on the part of the experimenter or model. The movement consisted of the model raising his hand toward his head prior to saying, "Do this." During training the model had held an edible in his hand; however, in the transfer tests the edible was omitted. The hand movement alone elicited imitative responding from the child in the new setting. The authors suggest that the four children who did not transfer their responses to the new setting and new person failed to do so immediately after training because of their extreme "over-selectivity" in choosing functional stimuli. They also suggested that overselectivity may be a characteristic of some autistic children.

The studies that have examined the acquisition of imitative responding by retarded children have not investigated the effectiveness of peer trainers. Adults have implemented the imitative procedures, modeled and reinforced imitative responses, shaped and "put" trainees "through"
any responses that did not appear to be in the child's repertoire initially. The purpose of the present study was to investigate whether non-imitative children could be trained by other retarded but imitative children to imitate a set of simple motor behaviors. A secondary purpose of the study was to investigate what conditions would maximize transfer of these imitative responses to new peers and new settings.
Method

Subjects

Four residents from the Child Development Program for Retarded Children at Stockton State Residential Facility participated. Two residents, both female, ages 11 and 16, served as peer trainers. Trainers' IQs were 28 and 44 as measured by the Stanford Binet. Both peer trainers spoke simple sentences and were highly imitative.

Two male residents, ages 13 and 8, with IQs of 15 and 11, as measured by the Kulman Binet, participated as peer trainees. The trainees were without language, but made some vocalizations and responded to a few simple commands such as "Come here" and "Sit down." Both subjects failed to imitate simple responses modeled by staff members.

None of the subjects had a history of involvement in experiments on peer modeling, response imitation, or peer training. Both trainees were involved in unit programs employing operant techniques to shape self-help skills. Both trainers were involved in school programs that employed operant technology.

Setting

The present study was conducted in a 5 ft. x 20 ft. (1.52 m. x 6.09 m.) room, located on the living unit, but isolated from the residents' living quarters. A trainer sat 2½ ft. (.76 m.) from the trainee on the same long side of a
4 ft. 7 in. x 2 ft. 5 in. (1.39 m. x .73 m.) table. The experimenter stood behind screens designed to obscure the door into the room and the trainee's view of the experimenter's behavior. There is no evidence to indicate that a trainee was aware of the experimenter's presence.

The experimenter observed trainers and trainees through peepholes in the screens and recorded all responses (see Figure 1).

**Stimulus Materials**

The experimenter used seven flash cards to cue the trainers' behavior. Four cards were "Peanuts" caricatures depicting the four behaviors to be modeled. The fifth card depicted a smiling face, and the sixth card depicted a frowning face; these were used to cue the trainer when she had performed correctly or incorrectly. The seventh card was a picture of two children helping each other. This card was used as the cue for the trainer to prompt a trainee physically, that is, to "put the trainee through" a response. The fifth, sixth, and seventh cards were used only during preliminary training and were not required during the actual experiment.

During blocks of reinforced trials, the trainers took into the setting a cup which contained various edibles such as candy, potato chips and cereals. These edibles were individually delivered to the trainee as reinforcers for correct imitative responses.
Response Definitions and Scoring

Four specific behaviors were modeled by trainers and scored as correct responses for trainees.

1. **Palms flat on the table** was defined as both palms of both hands flat on the table. The use of fists or one hand at a time on a surface were excluded from the response definition.

2. **Hands flat on face** was defined as both hands touching the cheeks of the face. Hands could touch ears, but palms could not touch the area above the ears.

3. **Arms extended overhead** was defined as both arms extended above ears, with elbows straight. Hands on head, one hand overhead, or hands over head but elbows bent were not acceptable responses.

4. **Clap hands** was defined as some part of both palms hitting together with sufficient force to produce a sound.

Trainee responses were scored as incorrect if the trainee failed to emit a response or emitted a response other than the one modeled.

Five trainer response measures were also identified and scored as correct.

1. Trainer said "Do this" before modeling a response.
2. Trainer physically prompted a trainee who failed to imitate.
3. Trainer delivered an edible after the trainee correctly imitated.
4. Trainer withheld edibles during conditions when it was appropriate to do so.
5. Trainer delivered an edible after physically prompting a trainee who failed to imitate a modeled response. Any other response on the part of a trainer was scored as incorrect.

Preliminary Training

The experimenter trained peer trainers in four stages. Training periods of two-to-four-hour duration occurred once or twice per day for 14 consecutive days.

Stage 1: The experimenter shaped each trainer to imitate the behavior of the characters drawn on the cue cards, explaining what the characters were doing, e.g., "These children are clapping their hands. Do what they are doing." The experimenter also modeled the response expected of the trainers and reinforced their responses with social praise when they imitated correctly. The trainers met the training criterion when they had imitated the behavior pictured on the cue card, without experimenter modeling, 50 out of 50 consecutive trials. The experimenter then taught the trainers to say, "Do this," before imitating each picture. Once a trainer learned, 50 out of 50 consecutive trials, to combine these two behaviors, i.e., say "Do this" and model the response displayed on the picture correctly, Stage 2 was implemented.
Stage 2: The experimenter positioned herself behind screens 15 ft. (4.56 m.) from the trainer and flashed cue cards overhead. Care was taken not to expose her hand, head, etc., to the trainee. The experimenter verbally cued trainers to perform when the card was shown and to sit quietly until the next card was shown. Sitting quietly between cues meant the trainer could not walk about, smile or talk. Experimenter's verbal prompts were gradually faded out and replaced by smiling- or frowning-faced cue cards, depending on whether the trainer had performed correctly or had erred. Correct responding was defined as the trainer saying, "Do this," modeling the behavior, and waiting for ten seconds until the next card was flashed. The criterion for introducing the next training stage was 50 consecutive correct trials.

Stage 3: In this stage of preliminary training a retarded but highly imitative peer sat at the table with the trainer who performed as described in Stage 2. When the trainer had instructed, modeled, and waited quietly for cues for 50 consecutive trials in the presence of a responding trainee, the trainer was graduated to the next stage of training.

Stage 4: The experimenter rehearsed with the trainer how to deliver an edible reinforcer to a trainee following the trainee's correct imitative responses. The experimenter also modeled and rehearsed with the peer trainer how to "put a trainee through" a response. When the trainers
performed correctly with the experimenter during 50 consecutive trials, a new and different practice trainee was introduced to the setting. Unlike the trainees used in Stage 3, these trainees frequently, but not always, failed to imitate, which gave trainers an opportunity to practice "putting through." When trainers had modeled the behaviors from cue cards and delivered a reinforcer contingent on a trainee's correct imitation, or "put through" and reinforced the practice trainee correctly on 50 out of 50 trials, training was terminated.

Procedure

Trainers conducted two types of trials throughout the experiment: reinforced trials and non-reinforced trials. On reinforced trials the trainer cued and reinforced appropriate imitative responses, that is, the trainer was a discriminative stimulus ($S^D$) for the reinforcement of imitation. In these trials the trainer gave the trainee an edible (potato chip, candy, cereal, etc.) after each correct response. If the trainee did not imitate appropriately, the trainer physically put the trainee through the behavior and then gave the trainee an edible. In non-reinforced trials, the trainer did not reinforce the trainee's imitations, that is, the trainer was a discriminative stimulus for non-reinforcement of imitation ($S^A$).

Each of the four behaviors modeled by the trainers was presented in a fixed sequence ten consecutive times.
constituting a block of 40 trials. Each day a block of reinforced trials and a block of non-reinforced trials were presented to a trainee by the $S^D$ and $S^A$ model respectively. A block of reinforced trials and a block of non-reinforced trials constituted an experimental session. One session occurred each day, four to five days a week. The order of occurrence of the blocks of reinforced and non-reinforced trials was randomized within each session, throughout phases 2, 3, and 4 of the experiment. During those phases therefore, a trainee might receive either a reinforced block followed by a non-reinforced block or a non-reinforced block followed by a reinforced block in any one session. Randomization of blocks was generated by the table of random numbers to ensure that an equal number of sessions began with each type of trial. Examination of the sequences demonstrated that this procedure was effective. In both blocks of reinforced and non-reinforced trials, the experimenter cued the trainer every 10 seconds. On cue, the trainer said, "Do this," and modeled the behavior. The same four responses were always modeled in both types of trials.

Prior to each day's session, the experimenter would instruct the trainer to bring the trainee to the room and have him seat himself. After a few seconds, the experimenter would enter the screened area and flash a cue card depicting the imitative behavior for the trainer to cue and model.

After the first block of 40 trials, the experimenter left the screened area, knocked on the door of the room,
and asked the trainer to escort the trainee from the experimental setting. The experimenter was not present as the trainer and trainee left the room. The same trainee was then conducted to the experimental setting by the second trainer to begin the second block of 40 trials in the session.

Both trainees went through five experimental phases, all administered by the same two trainers. Trainees went through the same order of experimental phases, but started and finished them at different times in a multiple baseline design across subjects (Baer, Wolf, and Risley, 1968).

Phase 1 was baseline for both trainees and consisted of both trainers conducting non-reinforced trials for both trainees. This phase was conducted to assess whether different trainers had different effects on the rate of the trainers' imitative responding, initially. Phase 1 lasted nine sessions for Trainee 1 and 20 sessions for Trainee 2.

Phase 2 was designed to assess the role of contingent reinforcement by a peer trainer ($S^D$) on the trainee's rate of imitative responding and to assess generalization to an $S^A$ model. Each trainer maintained a consistent role as either an $S^D$ trainer or an $S^A$ model for each trainee. Trainer 1 was the $S^D$ trainer for Trainee 1 and reinforced all Trainee 1's correct imitative responses. Trainer 1 also served as the $S^A$ model for Trainee 2 and conducted non-reinforced trials with Trainee 2. Trainer 2 conducted reinforced trials with Trainee 2 and blocks of non-reinforced trials with
Trainee 1. Phase 2 lasted 25 sessions for Trainee 1 and 21 sessions for Trainee 2.

Phase 3 was a continuation of Phase 2 in a different setting. In Phase 3, the setting was changed to investigate the role of the setting as a possible independent variable affecting the rate of imitative behavior. All contingencies remained as in Phase 2 except that a trainer and trainee sat across from each other on a single bed in a small bedroom instead of at a table in the original training setting. Phase 3 lasted 15 sessions for Trainee 1 and 12 sessions for Trainee 2.

Phase 4 investigated the failure of explicit discrimination training to result in discriminated responding. Phase 4 reversed the roles of the trainers for both trainees. That is, the trainer who had reinforced imitative responses of a trainee in Phases 2 and 3 now did not reinforce that trainee, and the model who had not reinforced that particular trainee now reinforced his imitative responses. Phase 4 lasted three sessions for Trainee 1 and four sessions for Trainee 2.

Phase 5 was conducted to (a) eliminate the tantruming and minor self-abusive behavior that the trainees exhibited during Phase 4, and (b) to prevent further deterioration of the trainers' performance in training evidenced by their increase in errors during Phase 4. In this phase both peers functioned as trainers reinforcing both trainees in both daily blocks. Phase 5 lasted six sessions for Trainee 2 and nine sessions for Trainee 1.
Reliability

Reliability was recorded by two independent observers at least once during each phase of the experiment. The independent observers were trained on recording during preliminary training for peer models. Observers’ scores were compared with the experimenter’s scores to obtain reliability measures during the experimental phases of the study. Observers were positioned next to the experimenter behind the screens but stood so they could not see the observer’s score. Reliability was calculated for all sessions and for each of the response measures taken. Reliability for each response measure (of both trainees and trainers) was calculated using the formula:

\[
\text{% Agreements} = \frac{\text{Number of Agreements}}{\text{Number of Agreements} + \text{Number of Non-Agreements}} \times 100
\]

Interobserver reliability for all response measures averaged 98%, ranging from 93% to 100%.
Results

Figure two shows the percentages of correct imitations per block of trials for Trainee 1 and Trainee 2 respectively.

During Phase 1 (baseline), Trainee 1 imitated both the trainer and the model who were not providing reinforcement fewer than 10% of the trials and Trainee 2 imitated the trainers fewer than 15% of the trials per block.

During Phase 2, Trainee 1 increasingly imitated both Trainer 1 ($S^D$ trainer) and Trainer 2 ($S^A$ model). Trainee 2 also demonstrated increasingly high rates of imitative responding to both Trainer 1 (the $S^A$ model) and Trainer 2 ($S^D$ trainer). It can be seen that the rates of imitative responding to both the trainer and the model for both trainees were maintained throughout Phase 2. A notable difference is that Trainee 2's percentages of correct responses is more variable to both Trainer 2 ($S^D$ trainer) and Trainer 2 ($S^A$ model) than Trainee 1's responses to either the $S^D$ trainer of $S^A$ model.

During Phase 3 the rate of imitative responding for both trainees was maintained both in the presence of the trainer and the model despite the change in setting. Trainee 1's level of imitating the $S^D$ trainer was consistently near 100% levels, but responses to the $S^A$ model were initially more variable than in Phase 2. Trainee 2's rate of responding was more variable than Trainee 1's but consistent with his
performance in Phase 2. Setting did not appear to be a
variable controlling the percentages of correct imitations.

During Phase 4 when Trainer 1 became the S^A for
Trainee 1, the trainee's rate of imitative responding dropped
dramatically to near baseline levels. Trainee 1's rate of
responding to Trainer 2 (the new S^D trainer) increased to
levels slightly above rates of imitating the trainer when
she was an S^A model. Trainee 2 imitated Trainer 2 (now
the S^A model) at levels lower than in baseline and imitated
Trainer 1 (now the S^D trainer) at levels higher than ex­
hibited in all previous phases.

During Phase 4 non-reinforced trials, Trainee 1 began
to exhibit severe temper tantrums, and Trainee 2 began to
engage in minor self-abusive behavior, and both engaged in
stereotypic behaviors. For example, Trainee 2 beat his
fingers on the table, screamed, took off his shoe and rotated
it back and forth repeatedly; Trainee 1 shook his arms across
his chest rapidly and picked at his clothes.

Prior to Phase 4, trainers had been appropriately cuing
and modeling 100% of the experimenter's cues. During Phase
4, the trainers made verbal and modeling errors. Trainer
1 made eight modeling errors and three verbal errors and
Trainer 2 made one verbal error, at which point she began
to cry and tantrum and had to be removed from the session.
Trainer 2 was told by the experimenter that she was not a
bad girl, comforted, and returned to the session. She made
no errors after that but whimpered throughout the remainder of the session. Trainer 1's temper tantrum lasted for four hours after the third session of Phase 4.

During Phase 5 both trainers reinforced both trainees. Both trainees' rate of imitating both trainers reached near 100% levels. In this phase, there were no incidents of tantruming, self-abusive, or stereotypic behaviors in trainees or trainers.

Data collected on trainer performance demonstrated that the trainer's rate of putting a trainee through a response decreased as the rate of trainee's imitative responding increased.
Discussion

It is evident from Phase 1 data that the trainees seldom imitated peer models. Both trainees' rates of imitation increased during Phase 2 when reinforcement was provided. In Phase 2 both trainees' rates of imitative responding increased in the presence of both the $S^D$ trainer and the $S^A$ model. Intermittently non-reinforced trials seemed to be massed for a trainee if one day's session ended with a block of non-reinforced trials and the next day's began with a block of non-reinforced trials, as a function of the randomization of the two types of blocks within sessions. Even when this occurred, the percentage of trials per block in which the trainee correctly imitated the responses of the $S^A$ model did not approach zero. During the thirtieth session Trainee 2 took an edible out of his mouth and refused to eat any more reinforcers during that block of trials. Though he continued to imitate some responses, the percentage of correct trials was reduced during this block. For all subsequent blocks of training trials the experimenter varied the reinforcers and no further evidence of this behavior was observed in Trainee 2. Trainee 2's percentage of correct response trials to the $S^A$ model begins to show a decreasing trend during the latter half of Phase 2. It may be that extending Phase 2 for a longer period of time would have resulted in the extinction of responding to the
Trainee 1's percentage of correct imitations of the $S^A$ model did not decline during Phase 2. The data from the present study are inconsistent with the findings of Stokes et al. (1974), which suggest that at least two experimenters must reinforce imitation to a model before stimulus generalization to a new experimenter occurs. It was hypothesized, therefore, that imitative response rates were high in non-reinforced trials as well as in reinforced trials in the present study because setting variables might be controlling imitative responding.

In Phase 3 all variables except the setting were identical to those in Phase 2. The results suggest that setting was not an important controlling variable. Both trainees' rates of correct imitative responses remained the same during both reinforced and non-reinforced trials in the new setting. This is consistent with Rincover's and Koegel's finding (1975) that stimuli associated with models appeared to have more control over the generalization of imitative responding than did setting variables. Six of ten subjects in that study generalized their imitative responses to new settings immediately.

In Phase 4, trainees' imitative responding extinguished during non-reinforced trials and remained near 100% in reinforced trials. Trainees' tantruming and minor self-abusive behaviors that occurred during non-reinforced trials were consistent with prior findings concerning the effect
of extinction on emotional responses (Bandura, 1969).

Trainers' performances were also disrupted during Phase 4, perhaps because the trainees' behaviors during those non-reinforced trials were punishing to the trainers. These results serve to emphasize the importance of consistency in delivering contingent reinforcement for desired behaviors and correctly fading out a CRF schedule of reinforcement following intensive training, so that rapid extinction of responding does not occur and undesirable emotional behaviors are not generated. These results also raise an interesting question with regard to the behaviors of trainers and training in the usual institutional ward setting. It is possible that inconsistency in the staff's reinforcement of peer-models good behavior decreases the probability that the other children will imitate those peer models. Peers may have difficulty in discriminating when to imitate a model if that model is not appropriately reinforced by the staff. Further research is warranted to investigate this possibility.

Phase 5 was instituted in an effort to insure that the trainees' minor self-abuse and tantruming did not persist and to insure that trainees would resume imitative responding to both trainers. Both trainees maintained nearly perfect rates of imitation when both trainers again reinforced all correct imitative responses.

In summary, peers can learn to imitate peer models. Peers' ability to learn from peer trainers is helpful in that learning through imitation appears to speed learning
and increase socialization. It is also interesting to note that, with careful training, peer trainers can "put through," reinforce, and "fade" out prompts errorlessly. Both trainers were errorless in performing the chain of training tasks until negative interactions with the trainees occurred in Phase 4.

Informal observations of the trainees on the unit suggest that they are continuing to imitate the responses of other staff and these two trainers. In addition, observations of the peer trainers indicate that they can keep a small group of 15 peers in imitative games for 20 or 30 minutes, contingently reinforcing these peers with edibles and praise, with minimal staff supervision. This is an aid to the unit staff, enabling them to provide explicit one-to-one training of other important behaviors to residents. Considering the conditions in institutions like the one in which this study was conducted, where the staffing ratio is often one-to-sixteen, this increase in peer-peer imitation and concurrent increase in staff training time would seem highly advantageous and worthy of more systematic study. One such study is currently in progress. The purpose of the study is to investigate the long-term effects of the procedures and results obtained in the present experiment, on maintenance of imitative responding in the trainees, spontaneous modeling in the peer models, and rates of social interaction among peers.
Bibliography


