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A Partial Component Analysis of Modeling as a Technique for Increasing Normative Work Rates in Rehabilitation

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A PARTIAL COMPONENT ANALYSIS OF MODELING AS A TECHNIQUE FOR INCREASING NORAMTIVE WORK RATES IN REHABILITATION

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The acquisition of an acceptable percentage of normative output in a rehabilitation setting is a common problem in vocational rehabilitation. Consistently effective techniques do not exist for the teaching of clients to work at what would be considered a high percentage of normative output. The present effort studied selected components of modeling to attempt to provide a cost-efficient, effective method for rate acceleration. The percent of normative output was the dependent variable. The study was terminated by implementing the most effective condition as a training tool to produce the highest normative rate possible.

Proximity to a fast worker had little effect on work rate. Reinforced attention to model produced some small positive change in rate. Subjects were reinforced for modeling in the second experiment with small gains. There were no clear differences between staff and client models. Aggregate data overall reflected minimal change, individual data was more variable.

DESCRIPTORS: normative output, modeling, attention, multi-element design, component analysis, vocational rehabilitation, behaviorally retarded, contracting, reinforcement value, prompting, probes, maintenance.

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CHAPTER 1

Introduction and Review of the Literature

With the development of behavioral technology it has become increasingly possible to teach complex work skills to even the severely behaviorally retarded (Bellamy, 1976, 1979; Gold, 1969, 1972; Rusch & Mithaug, 1980). The need, therefore, for rehabilitation populations to acquire the work behaviors to perform jobs other than menial, low paying and repetitive tasks has been partially remediated. While it is now possible to train sophisticated multiple-stepped operations to criteria and even in excess of many job specifications, similar consistent success has been elusive in training normal rates of production.

Some experimenters have argued that training of the severely mentally impaired or workshop populations in general to approximate a normal output rate, while desirable, is unnecessary given the quality of work they can be trained to do. Gold (1973b) and Levy, Pomerantz and Gold (1977) also argued that the stimulus characteristics of many contracts in rehabilitation lead to low productivity through boredom. The argument, while it may have valid points, fails to consider that a large number of jobs in the rehabilitative environment parallel work done by normal individuals, who do the job at significantly higher rates. The repetitiveness and boredom of many normal production-line jobs clearly rival those of rehabilitation workshops. Kahn and Burdett (1967); Tate and Barhoff (1967); and Bellamy, Peterson and Close (1975) have also made similar observations concerning task complexity

and novelty. Futhermore, while quality is important in most jobs, and more in some than others, i.e., computer circuit boards, to spurn rate is to ignore normal contractual demands; it is counter-normative.

The rate at which clients work also has legal ramifications. Chaffin (1969) Brown, VanDeventer, Perlmutter, Jones and Sontag (1972) and Bellamy (1976) recognized these factors when they noted that a retardate legally had to function at seventy percent of "norm" before he could be placed in a competitive "sheltered workshop." Clients below the seventy percent level are placed in work acitivty programs. It should be clearly noted that there are often significant programmatic and earning differences according to normative output. The basic environmental contingency differences between the generally vastly different levels of programming in rehabilitation further emphasize the importance of a client moving as far through the system as possible. The reason is an often found inverse relation between level of normalizing contingencies and competency level (Raynes, 1980). Beyond programmatic placement, rate is a determiner of potential community job placement. Rate of output in the natural environment is a prime determiner of placement success, pay and advancement.

Rate in many of the following studies has been assessed with regards to its significance using statistical analyses that establish the reliability of the change. The use of statistical measures of significance as experimental criteria ignores the question of social significance. Many of the studies report results which are clearly statistically significant, but results must also be clinically and practically significant. A change to be therapetuic must often be

of a gross nature and not subtle. The studies to be reviewed report their results overwhelmingly as simple percents of increase, decreases in response latency, or as levels of statistical significance. None of these measures address the issue of practical or therapeutic value. Reporting of the results as percentages of normative output does.

The concept of normative output allows for an analysis of practical therapeutic change. Using a simple percent of change measure for example, we might find a client to have a baseline output of 10 pieces per hour. After our treatment, the same client may have had an increase of 10 pieces per hour; this would be an increase of 100%. It would appear significant and test as such. Its actual social significance would be of some question when we compare this rate to that of a normal individual. The use of percents of norm does this.

To use a percent of norm as a measure of therapeutic significance a time study is first completed using several individuals to establish a mean normative rate per hour. A client's rate over an hour is then compared to this to yield the percentage of norm. Given our same earlier client with the baseline rate of 10 pieces per hour and an increase to 20 pieces per hour after therapy, the practicality of our intervention becomes much more clear when we compare these rates to a normative rate of 100 pieces per hour. In baseline the client was working at 10% and 100% increase. While the client's rate did increase 100% in terms of a simple percent of increase, its social and therapeutic practicality was much less and this for the client and therapist is what is most important (Helmstadter, 1970; Hersen & Barlow, 1976). Studies reviewed will therefore be critiqued in terms of their analytic method, as well as the results derived.

Researchers attempting to remediate the rate differential between the behaviorally retarded or disturbed worker and the so-called normal population have taken a number of different approaches. Zimmerman, Stucky, Garlick and Miller (1969) working with multiply handicapped clients found token reinforcement to be effective statistically when made contingent on increasing work rates in assembling terminal boards and folding bags. Unfortunately, the data were not translated into percents of normative output. Feedback alone in the same study was ineffective in modifying rate by the authors. Screvin, Straka and Lafond (1971) utilized tokens in various reinforcement schedules and occasioned rates of output they characterized as being more commonly found in the more mildly handicapped. While the levels of output were very good, it should be noted that a large investment of staff-time was necessary. Furthermore, the results were again not reported as a percent of normative output. The study by Screvin et al. is reminiscent of the operant analysis of schizophrenic behavior by Lindsley (1956) in the technological and descriptive level of analysis. Repp, Klett, Sosbee and Sprik (1975) found token reinforcement coupled with response cost for errors to be more effective when tokens for work alone in significantly increasing rate. Once more, no percent of norm was reported.

Token reinforcement has also been made contingent upon work behavior other than directly on rate. The results have been mixed, but suggest reinforcement of collateral work behaviors may sometimes be facilitative of rate under some conditions and an aid in building good general work skills. Trybus and Lacks (1972) working with a

mildly retarded subject increased production rates by reinforcing work-appropriate behaviors. The authors reported large additional increases when cueing lights were utilized to indicate to the subject where work behaviors were appropriate. The therapeutic significance of the study is unclear, given that it was not reported as a percentage of normative output. Karen, Eisner and Endrus (1974) also used tokens in a procedure where the experimenters reinforced collateral work behaviors such as visual attention to task, staying at the work station wearing an apron, and using a time clock in a nursery specimen can construction project. The subjects were also severely retarded. The authors found the number of prompts needed to maintain visual attention to task decreased significantly. Error rates also decreased, but production did not increase. Schipp, Baker and Cuvo (1980) reinforced attention to work task and studied its relation to production rate; they found no facilitation of rate. The authors concluded that if rate acceleration was desired contingencies should be placed directly upon the behavior.

Some researchers have investigated the use of goal-setting as a method of rate acceleration. Zimmerman, Overpeck, Eisenberg and Garlick (1969) working with three subjects in a prevocational program on terminal board assembly devised an experiment where three variations of goal setting were explored. Subjects under all three conditions were told the average number of units they were expected to produce on an hourly basis. They were informed at the end of the day if they had met the goal level stated. One subject merely had a goal set. The subject met the goal only once in seven days.

Negative consequences were then added to the package, but also resulted in no change. A second subject showed a reduction from the rate variability present in baseline and met the goal criterion eleven of seventeen days. Further increases were demonstrated when positive incentives were added. For a third subject, goal setting and incentives increased performance over baseline, but the increase was maintained only as long as goal setting was in effect. A weak effect seems to have been demonstrated, but its social relevance given the lack of normative data is uncertain.

Kleibhahn (1967) working with four retarded male adolescents studied the effects of goal setting and modeling. The experimenter found goal setting was superior to baseline performance, but equal to modeling as a rate acceleration technique. Once more no normative data were presented to allow for a meaningful therapeutic analysis.

Goal setting on the basis of the studies reviewed appears to be an uncertain to weak method of rate acceleration. Further definitive studies are clearly needed.

There is substantial literature on the general effects of positive reinforcement with regard to rate acceleration. Bellamy (1976) in a review of the literature classified the studies as follows according to event type: edibles (Brown, Johnson, Gadberry & Fenrick, 1971); choice of work assignments (Zimmerman, Overpeck, Eisenberg & Garlick, 1969); increased frequency of supervisor contact (Bellamy, Peterson & Chase, 1975); feedback (Levy, 1974; Jens & Shores, 1969); music (Bellamy & Sontag, 1973; Podvin, 1967; Cotter, 1971); and money (Schroder, 1972a; Evans & Spradlin, 1966; Huddle, 1967; Brown, VanDementer, Perlmutter, Jones & Sontag, 1972).

All the studies above documented a reinforcement effect though many were subject to some common problems, i.e., demonstration of control, method of data analysis, etc. Below are a number of better as well as representative studies.

Fuller (1976) conducted an experiment where a single profoundly retarded subject was taught to assemble a three-piece heat sink. The dependent variables in the study were off-task behavior and production time. A standard reversal design was used. Baseline consisted of a fixed ration schedule (FR-20) of reinforcement for product completion. Social praise was given contingent upon FR completion along with one cent. The client was also on a variable interval schedule of social praise for on task behavior. Off task behavior was placed on extinction, except for tantrums, which resulted in time-out.

Treatment was the same as baseline except a bonus of a penny was added each time the subject completed the fixed ratio schedule within the mean time required for completion of the FR. The bonus condition functioned as a limited hold. The results of the study showed a better than a halving of time off task and a reduction, 67% of the mean time for completion of a single heat sink. These results appear dramatic until it is asked what the normative rate of output was and what the mean normative percent time off task was. The author gives none of this data. Furthermore, during the second reversal, the client's off-task behavior continued to improve and was significantly less variable than during the last treatment phase, thus showing a failure of experimental control. The average production time also did not return to earlier baseline levels during the second reversal, but became

stable at a level only a tenth of a minute higher for unit completion than during the final treatment phase, which showed some variability. Excluding the phase change lines and looking at the experimenter's graph as a whole, the overall continuous direction of change is somewhat downward. There is a question of whether we are looking at practice effects.

The experiment has not been replicated and was conducted with only one subject, but shows a great deal of potential and is reminiscent of the work by Bellamy, Peterson and Close (1975) and most recently of Martin, Pallotta-Cornick, Johnstone, and Gayos (1980) in its potential. The next study by Huddle is perhaps more representative of the work conducted in the field.

Huddle (1967) working with the trainably behaviorally retarded who were assembling television rectifiers was able to reach a level of production which was approximately sixty-seven percent of norm by directly reinforcing performance. It is interesting to note in Huddle's study that one client in the control group performed at approximately 125 percent of norm. The performance was not directly reinforced, therefore it appears that either the job or possibly the extra social attention provided by the experiment may account for the outstanding performance. The validity of the population selection method must also be questioned. Gardener (1971) reviewing the work of Screvin, et.al. (1971) found by using electronic programming equipment and various schedules or reinforcement he was able to report highly encouraging increases. It must be noted that a high level of technological input coupled with a high level of staff time was needed to yield these results. Equipment costs

for a program similar to that of Screvin et al. would be prohibitive for many agencies. Consistent with the analysis of many other studies, these results were not reported with reference to normative percents. Thus, while a client may have doubled his output or even quadrupled it, his actual rate when compared to a normal person's may be therapeutically inadequate.

An important factor in the above studies may be that roughly two-thirds of them had experimental sessions of forty-five minutes or less. The mean of these sessions was eighteen minutes. Thus, while increases may have been obtained, many of the sessions may have been too short to determine if the effects were enduring or transitory. Fatigue in any work situation is a factor on output.

The application of reinforcement procedures in a variety of forms appears at first glance to have been successful in increasing the rate of output (Bellamy & Sontag, 1973; Brown, VanDeventer, Perlmutter, Jones & Sontag, 1972; Huddle, 1967; Schroeder, 1972b; Trybus & Lacks, 1972). Once more many of these studies involved extremely short daily work periods. The use of token economies, provision of tangibles and a number of the other procedures included required expenditure and staff involvement not always available or consistent with the normal environment. While significant changes are shown to occur, and the directions are labeled relevant, the question of whether the changes were therapeutic--practical remains unanswered.

While reinforcement in most studies appears to have a positively accelerating effect on work rates, a large number of the studies lack a clear demonstration of experimental control. Inspection of the

performance curves across sessions would seem to indicate possible practice effects (Brown et al., 1972). Gold (1973) notes that subjects can reach high rates of performance with excellent quality having no other reinforcement than the "intrinsic" qualities of the task. Given the general conditions of social deprivation in many institutions, a short period of intensive training, with verbal instruction and novel tasks may be very reinforcing, even without the added event of descriptive praise. The presentation of a structured activity can also be reinforcing under these conditions.

A number of studies are not easily classified as being simple reinforcement studies, etc. They typically combine several techniques into a package approach. Several of these have shown desirable effects though in the last study reviewed we once more are left without normative data.

Bellamy, Peterson, and Close (1975) conducted a study with a single severely retarded subject utilizing praise and prompts on assembling a 52-piece cam switch actuator. The experimenters used two treatments, one being a praise condition on roughly a fixed interval schedule of two minutes, and a prompt condition where the experimenter reminded the subject to return to work anytime they were off task. The first contingency was applied in the morning, the second in the afternoon, in a multiple schedule design. The later was embedded in basic ABAB design where the multiple schedule composed the first treatment session and a combination of both independent variables comprised the second.

The client had a normative output of 56.2% during baseline, and

a range of 48 to 100% of norm. During the multiple schedule treatment the client's mean normative output was 94.6% during the praise condition and 102.5% during the prompting segment. The range of variability during the praise treatment was 77 to 100%; the range under prompting was 74 to 133%. These are considerable differences. During the second treatment condition when both praise and prompts were combined, the mean normative output was 101.1% superior to the earlier praise only condition, but virtually similar to the prompt condition. The range was 72 to 122% of norm. It must be noted that the client was receiving an hourly wage based on normative output. The data presented by the experimenters is insufficient to gauge the effect of the experiment on this contingency, but it seems probable the hourly wage increased significantly during the rate acceleration procedure. The intermittant high rates of the client during baseline also suggest he may have already known how to work fast. The authors do not discuss this, nor do they discuss equality of the second treatment results with those of prompts alone.

Bellamy (1976) in discussing the effects of antecedent events may have explained the results when he noted that Skinner (1957) indicated instructions will be effective only to the extent that they signal the opportunity to obtain reinforcement. Both the praise and prompts sections may have been functioning in essence as nothing more than instructions, feedback about the subject's output, thus earnings. Prompts in this case were perhaps more effective signals, being more directive, for the opportunity to earn reinforcement, than simple praise.

Antecedent event manipulations, particularly instructions, have also been shown to be an effective event in a number of the studies (Evans & Spradlin, 1966; Gordon, O'Connor, & Tizzard, 1955; Headrich, 1963; Hunt & Zimmerman, 1970). Once more, Skinner (1957) noted that instructions will be effective commensurate with the degree they signal the opportunity to obtain reinforcement through responding in some way. A similar argument must be made for those studies utilizing feedback. Feedback as a functional consequent event that influences rate must also be paired in some way with reinforcement, whether the event is graphic, verbal, or textural. Millenson (1967) discussing feedback less its cognitive and mechanistic ramifications states it is equilvalent to the events we label primary and secondary reinforcement. Given this analysis, the mechanism of feedback is subject to the laws of reinforcement and the results of the studies are thus explainable in terms of reinforcement (Jens & Shores, 1965; Levy, 1974; Loos & Tizzard, 1955; Zimmerman et.al., 1969).

Martin, Pallotta- Carnick, Johnstone, and Goyas (1980) using what they call PSS--production supervision strategy--showed an increase ranging from a few percentage points to a 150% increase over baseline. The mean increase was 55%. These percentages of increase were not reported in percentages of normative output however. The PSS package includes the components of:: 1) reduction of distractions; 2) initial instructions; 3) picture prompts; and 4) social approval contingent upon on-task behavior. The system thus provides for extensive environmental manipulation and is labor intensive with regard to staff utilization.

Competition has been explored by a number of researchers with mixed results. Gordon, O'Connor and Tizzard (1955) found competition in teams as well as individually was superior to a control group. The magnitude of effect was small however, indicating only a weak experimental effect. Huddle (1967) working with moderately retarded subjects on assembling television rectifiers under conditions of cooperation with others, competition with others, and working alone, reported there were no signficant effects. Bellamy (1976) reviewing the results suggests that late in the experiment the competition group emerged as being superior when rewards were available. Bellamy (1976) in reviewing the literature on rate acceleration noted in a discussion of factors labeled "Social Facilitation" that Brown, Johnson, Gadberry and Fenrick (1971) and Huddle (1967) all found facilitative effects emerging from the development of spontaneous competition. The early literature concerning competition in increasing rate is thus unclear.

Barrish, Saunders, and Wold (1969) established a technique called the "Good Behavior Game" where students in a classroom were divided into two competing teams. The object was to see who could behave the best and consequently win extra privileges. The procedure provided clear and consistent improvement in classroom behavior.

Lutzker and White-Blackburn (1979) using a group contingency method called the "Good Productivity Game" based upon the work by Barrish et al., were able to produce increases of over 100% and 60% over baseline using only early work termination and edibles as reinforcers. It must be noted however that percents of increase were not percents of normative output but simple percents of increase. The

procedure bears further study however and utilizes a low level of staffing. The use of edibles is counter-normative, however.

Kliebhan (1967) noted imitation alone, where a confederate is planted in a group of working clients, was an effective means of increasing rate. The experimenter further tested the use of daily goal setting as a means of increasing rate. Once more a signficant increase was achieved, though neither of the rates was expressed as percentages of norm. Both of these techniques required a very low level of staff input. The utilization of artificial consequence control was also not a significant problem.

Brown and Pearce (1970) studying modeling as a technique of increasing rate in a series of experiments seemed to demonstrate exposure to reinforced models plus reinforcement and feedback was the most effective of a number of interventions. In looking at the experimenters' data there was a lack of experimental control and a number of abrupt and premature phase changes before the data had truly stabilized. The authors in surveying their data concluded that the parameters found in modeling at best produced highly individualistic rate changes.

The use of reinforcement schedules in manipulating rate has shown itself to be effective, but requiring a level of staff involvement, training technology and sometimes equipment not commonly found in vocational training settings. The use of token systems is an artificial mechanism that produces the problems of providing backup reinforcers and fading the system, before fading the subject into more normal environments. Given the structure of most work activity programs, can methods be found to increase rate within the program's

structure without being intrusive, requiring added staff involvement, training, or expense? A second issue deals with the form in which results are reported. A large number of the studies reviewed report the increase strictly as a simple percent of increase or as an increase of units completed per number of minutes of hours. While incomparison with their earlier baseline performance the changes may be statistically significant, the more relevant question is how therapeutically significant the results are? Finally, it was noted earlier that approximately two-thirds of the experiments reviewed had work sessions of forty-five minutes or less and a striking number presented data for fifteen minute sessions.

The present study examined modeling, and its functional process of imitation or observational learning as it is sometimes called, as a technique for increasing or producing normative levels of output. A parametric analysis was conducted utilizing a multi-element design to separate the possible effects of manipulating the various possible parameters. The analysis attempted to determine what the least intrusive effective method was as well as comparing this to more intrusive structured methods.

Imitation as explanatory concept has a long history. Gabriel Tarde in the 1900's sought to explain society through the process of imitation and published a book called Laws of Imitation (1890) in which he attempted to outline the mechanisms by which imitation worked (Timasheff, 1967). More recently Miller and Dollard (1941) discussed imitation from a more behavioral viewpoint emphasizing that it is the individual's ability to learn and the environmental consequences of

the learning that explain imitation. They also believed that as the imitator's discriminative ability sharpened the person would emit anticipatory imitational responses that would produce or reduce anxiety given the degree of match.

Mowrer (1950 & 1960) produced a theory centering on a vocal behavior, stating that imitation occurred because cues of a model acquire secondary reinforcement value through pairings with primary reinforcement. Through generalization imitation as a behavior acquires reinforcement value. Gewertz and Stingle (1968) summarize the overall process by saying that imitation is thus learned in an instrumental fashion though without direct reinforcement.

Bandura (1962, 1965b, 1967 & 1971) in calling imitation "observational learning" has emphasized a position where imitation is derived from associative learning and symbolic mediation. Only exposure to the model is needed. Neither punishment nor practice are needed. Reinforcement becomes a factor only when performance is discussed.

Cognitive approaches to imitation have also been put forward by Piaget (1951 & 1969) and by Kohlberg (1966 & 1967). Piaget sees imitation appearing through the mechanisms of contagion or echopraxis. Though resorting to these primitive explanatory devices, Piaget recognizes the importance of imitation in the development of the child, and particularly in the development of language. Kohlberg sees imitation as being acquired through intrinsic reinforcement.

This brief review of the history and explanation of imitation does not cover the two positions most germane to this paper. The first is the radical behaviorist view represented by Skinner (1953)

and Gewertz and Stingle (1968) who see imitation as being acquired and maintained as any other operant discrimination is. The second position is that of Arthur Staats (1968, 1971 & 1975) who does not deny the radical behavioral position, but instead goes beyond it positing a number of secondary reinforcement mechanisms. The legacy of Miller and Dollard as well as Mowrer will be clear in examining Staats' position. Both these positions will be discussed in depth shortly after a review of the basic animal and therapeutic research with imitation.

The generality of imitational learning has been demonstrated across the species. Grosbeck and Duerfeldt (1971), Kohn and Dennis (1972) and Stimbert, Schaeffer and Grimsley (1966) established clear imitative performances in rats in a variety of learning situations. John, Chesler, Bartlett and Victor (1968) found learning in cats was facilitated in both appetitive and avoidance learning conditions by the opportunity for observational learning. Imanishi (1957) and Miyadi (1964) made naturalistic observations of Japanese monkeys acquiring new eating skills through imitational learning. Darby and Riopelle (1959), Myers (1970) and Riopelle (1960) working with primates under a variety of experimental conditions all found clear evidence of imitational learning. The most significant and striking evidence was put forward by Premack (1976) and Terrace (1979) in reviews of work conducted with chimpanzees. In these analyses the experimenters attempted to in large part track verbal behavior through imitation. The results of both authors indicated substantial effects, though the question of whether or not primates outside of man could acquire functional, verbal behavior remained unanswered. Mackintosh (1974) in reviewing the work on imitation in animal studies has concluded that the best studies

on animal learning and imitation suggest the subjects are learning the significance of certain stimuli i.e., their discriminative properties. Human studies have in many ways concentrated more on application than on explanation.

The effectiveness of imitation as a technique for acquisition of both complex and simple human behavior is well documented. Arthur Staats (1971 & 1975) and Arthur Staats and Carolyn Staats (1963) have detailed complex theories for the centrality of imitation in the acquisition of intelligence and social behaviors by children. They have established an evidence base which is impressive. Baer and Sherman (1967); Hamblin, Buckholdt, Ferritor, Kozloff and Blackwell (1971); Hewitt (1965); Kaxdim (1973b); Kent (1974); Kozloff (1974); Lovaas (1966); Lovaas (1977) and Metz (1965) working with autistic, learning disabled and retarded children have shown imitational learning to be impressively effective in remediating the gross language, personality, and social deficits.

The effects of imitation learning have also been utilized in behavior therapy with a number of problems. Bandura, Grusec, and Menlove (1967) and Ritter (1968, 1969b, & 1969c) showed firm results in ameliorating dog phobias and phobias of height. Bruch (1975) successfully worked with adults in treating anxiety which is a common component in many behavioral disorders. Social isolation and withdrawal have been successfully changed by O'Connor (1969) and Ross, Ross and Evans (1974) working with children. Sarason and Ganzer (1969) working with delinquents were able to improve common problem solution skills. Ascher and Phillips (1975) were able to develop effective

social skills in mental patients through imitational learning. Gittleman (1965) was able to reduce aggressive behavior; Stawar (1976) working with the similarly destructive behavior of fire setting also showed desirable results. The efficacy of imitational learning in behavioral therapy has been clearly demonstrated as well as its generality across problem behaviors.

There are two basic theories of imitation. These will be reviewed and the experimental questions detailed.

Skinner (1953) notes imitation does not automatically occur; it is not an instinctual or reflexive mechanism. Staats (1971) also agrees there is no evidence of biological determinism. Imitation behavior is an acquired skill consisting of a number of subskills. In its basic function and acquisition it is analyzable as a three term contingency: a stimulus, a response, and a contingent event. It is in the early stages of conditioning a problem of whether a response occurring in the presence of a particular stimulus complex will come under the control of that complex with repeated reinforcements. It is also in the early stages of learning a problem in shaping, where through environmental contingencies the response is reinforced more and more selectively Gerwirtz et al., and Skinner also argue that as a class of functionally related behavior, imitation is solely acquired through extrinsic reinforcement and is supported by intermittant reinforcement. Staats while in basic agreement with the later statements also postulates some other forms of reinforcement. To clarify the approach taken her Staats' basic theory of imitation and acquisition in the child will be examined and extrapolations made to adult behavior.

Staats (1968 & 1971) postulates the parent's voice becomes reinforcing to the child through classical conditioning in the feeding and general care of the child as does their behavior in general. The young child makes a variety of sounds, some like those of the parent. These sounds are differentially reinforcing according to the degree they approximate the parent's voice. Given the reinforcing qualities of such sounds it is postulated they become more frequent. The parent may also directly reinforce some of these sounds thus carrying out shaping. The sounds are thus shaped by the reinforcement accrued, given their degree of match and by the parent. A primitive form of imitation is present in this process. Speech is not functional though until it is brought under stimulus control.

The parent may do this by presenting a verbal stimulus e.g., "Say Mommy," and reinforcing and initial approximations that occur and then shaping toward the target response. The same process holds for gestural responding, though here the parent may make the response's probability higher by putting the child through it physically. Both the probability of the specific imitated response and of imitation as a general class of related behavior will increase. In speech acquisition at least Staats indicates much of the training will be "self-conducted" by the child when before falling asleep or during play they verbally "practice" their speech repertoire. Those responses most closely approximating the parent's will have the greatest secondary reinforcement value and will therefore increase in probability. The same process is also applicable to other adult behaviors.

To reiterate an important point, basic to the response of imitation is the development of reinforcement value by the model. Staats assumes that if the adult is a reinforcer, so will his behavior be a reinforcer, thus the imitation of the model itself may be reinforcing. Staats here goes beyond the Skinner et al. model arguing for the secondary reinforcement value of the behavior itself in imitational learning. Given this approach, mannerisms, verbal behavior, i.e., attitudes and values, all may become reinforcing to the subject. Additionally, the degree to which a child is reinforced will partially determine the extent to which the subject finds imitation as a behavior reinforcing. Given a high level of reinforcement the child may imitate others simple for the reinforcement involved in imitating.

Staats unlike the other theorists discusses the acquisition and development of the component skills of modeling. One of these skills is attention. The child must have the visual or auditory observation skills for imitation, or accurate imitation to occur. The child or adult must observe not only the model, but also the stimuli controlling those actions. The acquisition of attentional skills may be very directly taught as when a parent says "watch this." The instructions may become even more specific when the model repeats a limited portion of the performance as when the parent repeats again and again the stance of a baseball batter. In discussing further the role of the sensory modalities, Staats makes the point that one of the first steps in imitation is discriminating that a model's performance is different form our current one. Beyond attentional skills the subject must have the appropriate sensory motor skills and they must be under the stimulus

control of the model or verbal behavior. Staats (1971 & 1975) gives a particularly detailed analysis of the problem in the teaching of children to print the alphabet.

Staats makes the point that the imitative learning of a response early in imitative acquisition takes longer than later response; there is a savings across trials as the child learns the general skill of imitative learning and its component skills (Lovaas, 1977; Staats, 1971). Staats in analyzing the sensory-motor learning sees the acquisition as coming in units. In learning to imitate the printing of letters, Staats saw the process as being one where the child first learned to hold the pencil, making straight lines, making circles, etc. In any learning situation the child learns both general and specific motor skills that can be applied to a variety of situations. These general abilities are what allows the child to imitate behavior in new environments or situations and also produce new responses for which there has been no direct training.

Staats also sees verbal behavior as an important factor in imitation learning in that the child or subject can describe verbally what they have seen and at some point later use the verbal behavior to direct future imitational efforts. A person may thus critique their own behavior an hour, days, or even months after the model's performance in reference to their own behavior.

Earlier it was noted that imitation was a learned process not a natural process. If it was a natural process the subject would imitate models equally. Staats notes this does not happen; instead, the child learns when, who and under what circumstances they will imitate. Staats postulates one of the most important control mechanism is the

reward value of the person, that is their secondary reinforcing qualities. A subject imitating a person with high reward value will be reinforced many times and this reward value will come to control imitational behavior. This process seems to be speaking toward the model becoming a discriminative stimulus for reinforcement, the model becoming a secondary reinforcer and their behavior also being reinforcing. The Skinner et al., model would predict differential discriminative stimulus characteristics based on the subject's learning history. Staats also makes the point that imitative behavior is more likely if the model is a skilled one, rather than an unskilled model. A skilled model will increase the probability of a reinforced response thus increasing the model's reinforcement value.

Both of the theories presented have extensive predictive and explanatory powers. Staats' theory however is in some ways more complete and specifies more of the conditions under which modeling may occur. Staats also considers the prerequisites for modeling; the subject must have both attentional and sensory-motor skills to adquately imitate a model. It must be noted, however, that Skinner-Gewirtz and Stingle model of imitation is the more parsimoneous.

Overall, the present experiment will use Staats' model to ask the question of what is the best feasible amount of input required to yield a significant therapeutic result using modeling. For imitation to occur, Staats (1971) notes, an adult must acquire reinforcing value for the subject, i.e., become a conditioned reinforcer. Basic research leads to the conclusion that the conditions for imitation in adults or other populations are no different than for children (Bandura, 1962).

The first part of the present analysis will passively manipulate the incentive value of the model, using a staff member and a client as models. Both of the models will be high rate workers with positive histories of interaction with the subjects of the study; the staff member would be expected to have a greater reinforcement value for the clients through his constant reinforcement of their behavior throughout the day. The question being asked is simply how much reinforcement value is needed to produce a result. If a client will suffice as a model, it would be far more cost efficient than using a staff member. The incentive value of a model's behavior is not the only factor governing imitation, though. Both the degree to which a subject is reinforced for imitation of models and observational skills possessed by the subject are crucial. These factors are more difficult to manipulate, requiring a greater amount of staff input, therefore being, perhaps, less cost efficient. In the present study proximity and attention (directed to) to the model were manipulated first in the study. The multielement design also included an alternation of models to determine the effects of different model's behavior's incentive value. With the above manipulations the basic questions being assessed are whether the occasion can be set for high rate work by simply placing a client near a high rate worker who is being reinforced. This was the first experiment.

Given Staats' thoughts on secondary reinforcement mechanisms it would be appropriate to predict some positive normative rate skills. The degree should vary with the amount of positive secondary reinforcement present. It should be noted Skinner and Gewirtz and Stingle

would predict rate changes would occur to the degree that the model's performance was discriminative for reinforcement. They would further state that enhanced performance would be unlikely given the lack of extrinsic reinforcement.

The second design studied the effects of reinforcing matching to sample effect of model. Here both positions on imitation would predict enhanced rates. Staats' position would given its emphasis on secondary reinforcement mechanisms and model characteristics predict the rate enhancement would be higher for the staff member-model.

CHAPTER II

Procedure

Subjects

The subjects in the study were five adults ranging in age from 26 years to 45 years, with a mean age of 33 years. Of these, one was female and four male. All were labeled mentally retarded with IQs ranging from 49 to 80 with a mean of 58. The clients at the initiation of the study had mean work rates ranging from 39% to 49% of norm with an overall mean of 42%. All the clients lived at home, and most in group living homes. As of the time of the study, none were considered placeable in competitive employment or in sheltered workshops due to their severe behavioral deficits or excesses: 1) a lack of consistent hygiene behavior; 2) ineffective communication skills; 3) inadequate social behaviors; 4) low quality work; and 5) a failure to follow instructions were among common behavioral problems. All subjects were selected on the basis of goals decided upon in meetings designed to assess needs twice yearly.

Models

The staff model in the study was a 23 year old male staff member who had worked with the clients on a daily basis approximately six hours a day for nine months. His job was to prompt, reinforce and decelerate client behavior as needed as he sought to teach them a variety of work skills. The staff member had been trained in the principles of behavior analysis as part of his work.

The client model was a 26 year old male with an I.Q. of 80 on the Stanford Binet. He was being groomed for graduation from the unit at the time of the study. The client model worked at a mean normative rate of 70%. His range of normative output was 35% to 110%. He lived in a group living home with a number of the other clients in the unit and with one of the clients in the study. He was a popular and friendly individual in the unit.

Setting

The setting of the experiment was the vocational training unit of McKercher Rehabilitation Center. The unit was designed to teach clients basic vocational skills common to most jobs and settings, e.g., punctuality, quality, rate, etc. The room where the therapy took place was 24 feet wide and 34 feet long. Along one wall was a work bench for heavy production and bench assemblies. A variety of cabinets and shelves contained training materials, tools and work simulation materials. The room also contained six tables with work stations for clients. The table that was used in the present analysis was 94 inches long, 48 inches wide, and 37 inches tall. Metal stools for the clients lined the sides of the tables. The room was well lit and moderately well ventilated. Adjoining were two offices, a group therapy area, and a lunch area that were intermittantly used throughout the work day. Approximately twelve other clients and one or two university practicum students also occupied the room and were continuously busy at pre-assigned tasks, or with teaching students.

Equipment

Clients recorded their own output on hand tally counters mounted so that they stood upright independently. A stop watch was used to time the sessions. Work materials for the clients to manipulate as part of their work were business size enveloped 3-7/8" wide and 8'7/8" long. Inserts for these were 3" by 5" plain index cards. The cards were stuffed into the enveloped to simulate many common mail stuffing jobs found in rehabilitation.

Experimental Design

Multielement Design

A multielement design sometimes known as an "alternating conditions design" was used to assess the effects of the various possible parameters (Sidman, 1960; Sulzer-Azaroff & Mayer, 1977; Ullman & Azaroff, 1975). Sidman (1960) first described this design as one where there is repeated measurement of a given behavior during repeated applications of the independent variables. Unlike the multiple-baseline or classic reversal design, the multielement design consisted of repeated conditions instead of consistent phases. In the latter the behavior is allowed to stablize under a given condition before a manipulation is made. Within the multielement design, baseline and experimental conditions are presented in random alternations within the session or from session to session (Ullman & Azaroff, 1975). Until the last few years, the above design was primarily confined to the laboratory. Recently, there has been a growth of its application to applied settings.

Termination and Maintenance

The study was to have concluded by utilizing the most effective design component or combination of components to accelerate the clients' rates of work. Given the ineffectiveness of the modeling package behavioral contracting was initiated as means for accelerating rate.

Data Collection Procedures

Raw data were collected at the end of each session from the subjects' individual hand counters. The subjects collected their own data each session on the hand counters. The experimenter then computed the percent of normative output at which the client worked. The percent was computed by placing the total number of units produced over the total number of minutes on the job and dividing the client rate per minute derived by a "normal" rate figure based on standard time studies. The resulting coefficient was converted to a percentage.

$$\% \text{ of Norm} = \frac{\text{\# of client units produced per minute}}{\text{\# of normative units produced per minute}}$$

This was graphed as a percent of normative output. In the present study, the normative rate of production was 670 pieces per hour. The models also collected their own data using a hand counter. Their data was treated as was the client's to yield a percent of norm. The collection of this data allowed the degree of match to be calculated.

Reliability was collected twice a week at the conclusion of a session by counting the subject's finished products and comparing the count to the subject's counter total. A percent of agreement was

derived. Reliability was calculated according to the formula below:

$$\frac{\text{Number of agreements}}{\text{Number of agreements + Number of disagreements}}$$

The collection of reliability data was performed by the experimenter or a client assistant.

Method

One rate acceleration session was conducted each day for 1 hour a day in the vocational training unit. The sessions were conducted at the same time each day, Monday through Friday, by the same staff members. Prior to the start of each session, enough materials for several hour sessions were placed at the work station, along with a hand tally counter and empty product bins. In each session the clients experienced one of four experimental conditions. These were presented on a randomized basis, derived through the use of a random numbers table. The experimental conditions were as follows:

(A) Baseline: The clients were all assigned to work on a common task. They were all told by the experimenter to "Do the best you can." Correct counter usage was tacted using descriptive praise, as was on-task behavior and attention to task on a FI-10' schedule. No other contingencies or procedures were present.

Experiment One

(B^1 and B^2)

The separation of models into client and therapist is to

parse out and determine the different incentive values of different model behaviors.*

Differential Placement (Proximity): All of the previous contingencies were in effect here also. Additionally, a "high normative rate" client was placed at the table with the subjects directly across from the other subjects. The high rate individual was privately contracted with, for a total _____of output outside of the session. No instructions were given to the clients with regard to the high rate subject. This condition was repeated with both client and therapist models.*

B^1 - client model

B^2 - therapist model

(C^1 and C^2) Differential Placement and Reinforced Attention to Model:

In the present condition subjects were reinforced for and prompted if necessary to attend to the model whether experimenter or high rate client. The latter condition was determined by random assignment. This was repeated with both client and therapist models.*

C^1 - client model

C^2 - therapist model

Clients were prompted and/or reinforced every ten minutes for attention to the model. Attention was defined as the subject visually fixating upon the model for 5 seconds or

more as they worked. Reinforcement in the form of descriptive praise which had been previously effective with all clients was used. An example of this was "Good, you're looking at and how fast he is working."*

Experiment Two

Baseline: This will be the same as in Experiment I. (D^1 and D^2)

Clients were reinforced for "matching" the model's performance in this phase. Matching was defined as exceeding 67% of norm or of a model's performance at any given ten minute interval. Clients working at 67% of the model's rate at an interval were descriptively praised. Clients not working at the "match" level were prompted to work faster e.g., "Speed up and work like _____ . You're working too slow." When none of the clients met this contingency after 10 sessions with each model, the criterion for reinforcement was lowered to working at 50% of the model's output. Since most of the clients work at about 30% of norm, both of these levels reflect a significant "match" and gain in terms of normative output.*

D^1 - client model

D^2 - therapist model

* The models were reinforced every ten minutes and at the conclusion of the session with extensive descriptive praise, e.g., "Wow, you're really moving; you're way ahead of yesterdays total already."

CHAPTER III

Results

Reliability

Reliability of counter use across the clients ranged from .89 to 1.00 with a mean of .96 in the first experiment. In the second experiment the range was from .83 to 1.00 with a mean of .92. Overall counter was reliability was .94.

Experiment One

The results of the first experiment are presented in Figure One. In the first experiment the mean baseline normative output was 46% for the group and the range was 36% to 58% for all clients. The individual subject means for subjects one through four were 36%, 41%, 58% and 47%. During client proximity the mean output for the group was 47% with a range of 39% to 55% of the norm. Individual means for subjects one through four are 39%, 46%, 55% and 49%. Staff proximity yielded a similar group mean percent of norm, 47% with a range of 38% to 55% of norm. The means for subjects one through four are 38%, 46%, 55% and 48%. Very little difference existed between the level of output for any of the clients and the level achieved when they were placed in proximity to either a client or staff member. None of the clients showed a meaningful level of change from baseline under these conditions. (See Figure 1)

Prompting a clients attention to the model yielded mean group scores of 52% and 53% of the norm for attention to a client model and

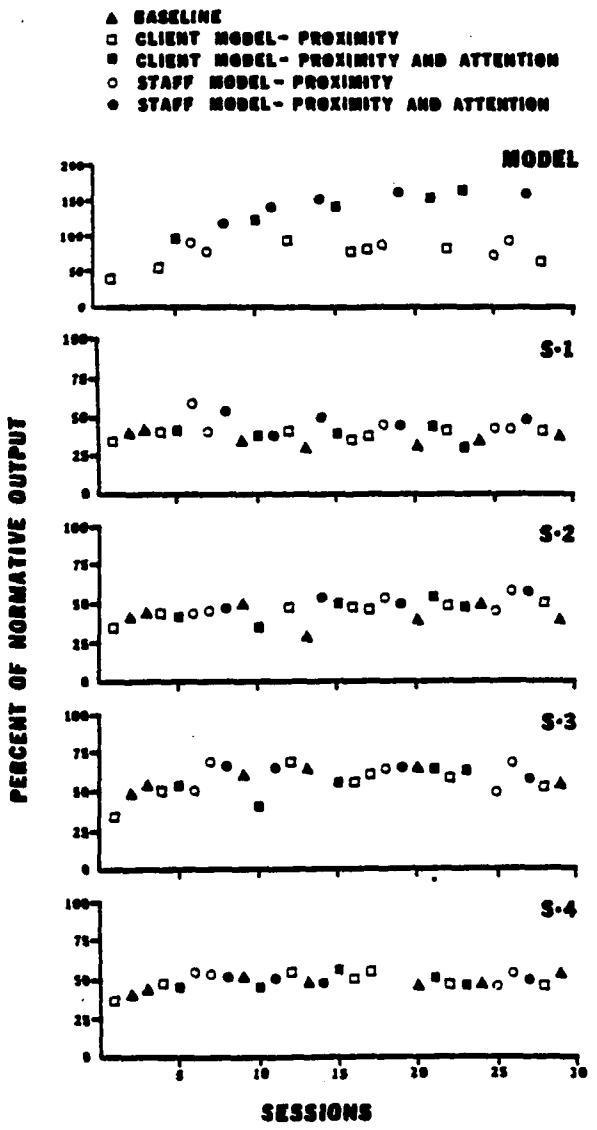

Fig. 1. Experiment I. Percentages of Sessions output as influenced by selected parametric manipulation of modeling.

staff model. Overall the mean percent of change from baseline was 5% of norm. Means for prompted attention to a client model were 46%, 49%, 63% and 51% of norm. Means for prompted attention to a staff model were 47%, 52%, 64% and 50% of norm. Clients one and two both showed 11% increases in their normative rate of output over baseline in the prompting of attention of a staff worker. These same subjects showed smaller increases of 10% and 8% when prompted to attend to a client model. Clients three and four showed smaller increases. Subject three showed increases of 5% and 6% over baseline and subject four showed increases of 4% and 3% over baseline.

Experiment Two: Part I

The results of Experiment II are in Figure Two. In the second experiment positive descriptive praise was administered contingent upon the clients matching the model's rate at 67% of the rate. Baseline output for all clients ranged from 44% to 62% of norm with a mean of 51% in the first half of the experiment. The means for subjects one through four were 44%, 48%, 62% and 50%. (See Figure 2) The mean of the client-model condition was 55% of norm. Individual means for the condition ranged from 46% for client one, 54% for client two, 66% for client three and 55% for client four. Subjects two and four showed the largest increases over baseline with increases of 6% and 5% when praised for matching a client model. The mean for the staff-model condition was 53% of norm. The range of norms was 47% to 62% of norm. The rates of normative output were 47%, 50%, 62% and 53% of norm.

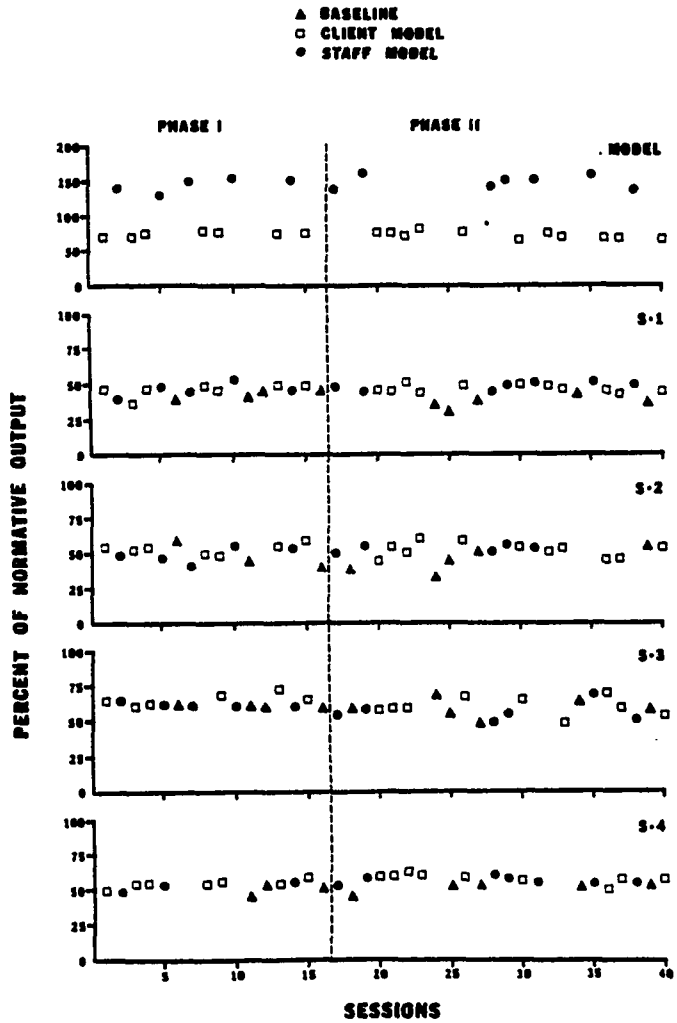

Fig. 2. Experiment II. Percentages of output as influenced by reinforcement for matching a model's rate. Phase I matching was defined as working at 67% of a client's or staff's rate. In Phase II matching was defined as matching the model at 50% of their rate.

Experiment Two: Part II

To facilitate the effects of staff modeling, the criterion for estimating a matching performance was lowered to 50%. It was thought this would bring the client into contact with reinforcement much more easily. The baseline mean was 49% of norm for all the subjects, 40% for subject one, 46% for subject two, 60% for subject three and 51% for subject four. Means for the client-model condition were little different in this condition from those of baseline. The mean of the scores was 55% of norm for the group. For subjects one through four the means were 46%, 53%, 62% and 57%. These means are little different from those in the first part of the experiment, differing only by a few percentage points. The scores for the staff model condition were also little different from those in the first part of the experiment. The overall mean was 54% of norm. For subjects one through four, the means were 48%, 52%, 59% and 56% of norm. These means were little different from the first half of experiment two.

CHAPTER IV

Discussion

The most salient finding from the present study was that modeling and an emphasis upon the manipulation of its components produced no socially-therapeutically significant increase in normative rates of production (Helmstadter, 1970; Hersen & Barlow, 1976). In the first experiment average increases over baseline were at a maximum 7% of norm for the group across all conditions. In the second experiment the mean increase was 4% of norm in the first half of the analysis and 6% in the second part for the group. The individual range of change was larger, as noted in the results section, but did not exceed 11% of norm. It is interesting to note that the largest change occurred not under conditions of maximum therapeutic input, i.e., direct reinforcement for modeling, but under a lesser condition where clients were simply prompted to observe a reinforced staff model working.

If the results for the analysis are recalculated as simple percents of increase and roughly equivalent conditions compared across studies, the present results can be compared to those of Brown and Pearce (1970) and Kliebhan (1967) where tasks of roughly equivalent difficulty were also used. Kliebhan found a mean 19% increases over baseline and a standard deviation of 32.41 points for a condition roughly equivalent to the present study's prompted attention conditions for staff and client models. The experiment at hand showed a mean increase of 16% with a standard deviation of 10 points for attention directed to a client model. For attention directed to the staff model a mean 19%

increase was found, with a standard deviation of 11 points. Under both of the present study's attention-to-model conditions performance increases were equal to or nearly so to that of the Kliebhan work. It should be noted that the present study produced far more heterogeneous results having much smaller standard deviations and hence amount of total variance.

In the Brown and Pearce study clients were exposed to reinforced models in conditions much like those present in the first experiment under differential proximity to client and staff models whose performance was reinforced. The mean percent of increase for Brown and Pearce's subjects in this condition was 14% though increases ranged from -2% to 22%. It must also be noted that changes were induced in this study before stability was obtained in given conditions. Under similar conditions the present study showed mean increases of 5% under client modeling and 3% for a staff model. The range was from 6% to a gain of 12%. These results are inferior clearly to those of Brown and Pearce. Brown and Pearce also had a condition where matching a model's performance was reinforced as in the present study. At the 67% criterion for match in the present study the results were 8% for a client model and 4% for a staff model. Under a 50% criterion in the present study for match the client rates were increased by 11% for a client model and 14% for a staff model. The range of change was from 3 to 15% for the client model condition and 2 to 20% for the staff model condition. Brown and Pearce showed a mean increase of 27% with a range of 20 to 40% gain.

Clearly under the last condition once more the Brown and Pearce study was superior in its simple percent of increase. The levels of

increase under reinforcement for modeling in the present study were clearly significant as percentages of simple increase, with some outstanding individual gains. The question posited early in this paper remains; of what practical-therapeutic significant value were these results? The answer is there was very little positive therapeutic gain in the present study and modeling is called into sharp question. These conclusions could have been obscurred though by the method of data analysis, as in demonstrated when comparing them to these studies.

The results were limited; why? The results obtained may have been limited because of the design used to study the components of modeling. The multielement design was set up so that conditions were changed each session. It may be that with regard to rate of work, unlike some behavior, modeling does not have immediate effects, but rather the effects are cumulative, building through practice. A hint of this problem may be seen in the Brown and Pearce (1970) study. A criticism of this study was that there were condition changes before the behavior had stablized. If the design had used blocks of a week in alternating conditions instead of single sessions the effects might have been more developed.

Staats (1975) has noted along with Bandura (1967 & 1971) that the speed and competence with which an imitational response is acquired is partly controlled by the presence of the behavior's response components in the subject's repertoire. This as an explanation of the failure for an accelerated rate to develop may have some credibility in retrospect. The topography of the performances by the clients was extremely variable. It is likely the efficiency of the topographies was also variable.

It should be noted the grain of the clients' performance was extremely variable when observed (Ferster & Skinner, 1957). It was noted that there were frequent pauses and irregular work rates, with clients frequently looking around the room. The secondary reinforcement mechanisms posited by Staats should control for these problems if they were functional. Inadequate reinforcer value due to a sparse conditioning history or pairing with work reinforcers could all be hypothesized as causal in the failure. The Skinner-Gewirtz and Stingle model would speak to a failure of stimulus control due to inadequate generalized imitation learning in the repertoires of the subject or a failure of the model to be discriminative for reinforcement. Given the inadequacies in the clients' learning histories the Skinner-Gewirtz and Stingle model would suggest that a more dense schedule of intermittant reinforcement would be needed to support imitative behavior.

Staats (1971) also suggests a schedule effect that may be a problem in the current study. Staats notes in his studies of imitation learning with children that effortful sustained responding must be shaped. He has further shown that until this learning has occurred, the more dense the reinforcement schedule must be. Beyond these schedule effects Staats emphasizes the importance of observational-attending skills in imitation.

To match a given response, attention must be focused effectively on a model. In the present experiment it was attempted to make functional attention more probable by prompting the receptor-orientation of the eyes (Staats, 1975). Skinner (1938 & 1953) noted that a subject is "attending" to a stimulus if the behavior is under the control of

that stimulus whether the receptors are maximally oriented or not. Using Staats' approach in the present study the highest rate changes obtained were found. Staats (1971) posited that for imitation to occur the subject must be able to discriminate a difference between their behavior and that of the model. Although the clients' verbal behavior indicated a recognition of differences, their behavior overall except in this condition showed little effect and even here it was small. Two avenues of research are suggested by these results, signal detection and stimulus control. The latter area is also suggested by the earlier discussions of the model's acting as a discriminative stimulus for reinforcement. It is possible attention in the present experiment was not under adequate control. Sensorimotor training emphasizing reinforcement for exact topographical matching using imitation or an effective attentive repertoire prior to the experiment, might have facilitated the modeling effect.

Two models of imitation have been looked at in terms of their explanatory power. The model of Arthur Staats was chosen as the basis for the present experiment's design. One of its prime differences from that of the Skinner et al. model that has already been touched upon is Staats' emphasis upon secondary reinforcement and higher order conditioning processes. Staats would posit that in the present experiment the staff member and all stimuli associated with him would in an antecedent and contingent manner be discriminative of and function as reinforcement more effectively than the stimuli associated with the client model. The reason would be the staff member's systematic daily association with reinforcing events e.g., praise, money, activity

reinforcers, etc. The client, Staats would maintain, would be less discriminative of, and reinforcing, given that his reinforcement history with the other clients would be social, intermittent and less systematic than that of the staff model.

Staats also believes imitation as a behavior may become reinforcing through its pairing with primary and secondary reinforcement. Furthermore, Staats (1971) argues that evidence exists that subjects imitate models who demonstrate "skill" or "proficiency" and that behavior matching such skilled behavior and its stimulus correspondents is more reinforcing than lesser matching responses once more through secondary reinforcement mechanisms. The Skinner et al. model sees imitation as emerging in the subject's behavioral repertoire as a general class of behavior supported by intermittant extrinsic schedules of reinforcement not by secondary reinforcement characteristics of the behavior. The concept of skill Staats discusses and concepts such as "model reinforcement value" raised by Bandura and Staats would according to Skinner et al. actually be explained by the discriminative properties of the model. Nevin and Reynolds (1973) in discussing stimulus control indicate that behaviors considered to be "higher mental processes" such as forming concepts like "proficiency" and its resultant control of behavior may be explained through stimulus control procedures. Stimulus control as an explanatory mechanisms seems to be emerging in this discussion as a source of greater potential understanding than perhaps some of the theory the present research is based upon.

The concept of model proficiency was studied to some degree in this study where there was a clear rate differential between the client and staff model. It must be noted that no clear significant therapeutic differences emerged. All of the theories reviewed would predict that when reinforcement was introduced directly contingent upon the imitational response an increase in rate should occur.

When descriptive praise was introduced into the design as a reinforcing stimulus for matching to sample by the subject no dramatic increase in performance followed. This invites the question of was the event reinforcing? It would be interesting to vary the type of reinforcement available for the subjects' matching to sample behavior. Money or other tangibles might provide a potency that was lacking. It should be noted, however, that when some clients were praised for their efforts, others often verbalized that they were working just as hard as the praised individual, or that they would tomorrow. This verbal behavior would seem to indicate some recognition of the events as reinforcers. The need for reinforcers beyond descriptive praise would potentially raise the cost of the present analysis. Also the issue of what is normative enters with the variance of reinforcers. Given the difficulty in obtaining money for training purposes, a token economy might be a desirable approximation of a normal "pay-for-work" system.

One of the early questions in this paper was finding a cost-efficient method of raising client worker's work rates. Given the amount of time the staff person acted as a model for the clients, particularly in experiment two, the amount of gain is extremely small. The addition

of money or other tangibles adds a further cost factor. At least in the present analysis modeling has not proven feasible as a method for accelerating client work rates significantly.

Future analyses might well center upon studying modeling from the Skinner et al. model. The stimulus control technology furthermore may hold the answers as to the crucial conditions for the establishment and maximization of imitation. Although the Staats' model provides a great deal of explanatory and predictive power, it also is complicated by its heavy dependence upon hypothesized secondary reinforcement mechanisms. Although Staats presents data to back up his model at a number of points, his explanations are equally or better presented by the Skinner et al. position. The Skinner position is also closer to the basic data of behavior analysis. Gewirtz and Stingle describe the later model as parsimonious; it is that and eloquent in its simplicity. Future studies might do better to emphasize this model rather than the other available explanations. Other technical approaches also need to be studied.

Lutzker and White-Blackburn (1979) and Martin et al. (1980) though representing extremely different methodological approaches to the problem of rate acceleration may represent the direction for future research. The real levels of rate acquisition need to be determined in terms of normative output studies for both of the above studies. The Lutzker and White-Blackburn "Good Productivity Game" would appear to be extremely staff efficient in terms of utilization. If the reinforcement systems could be normalized and the "Game faded, the procedure would be very efficient. A replication of the results of the "Good Productivity Game" over a larger period of time, across a

number of tasks and presented with reference to normative output is needed in light of the previous mixed results discussed in the introduction. The economy of environmental manipulation makes this procedure and interesting target for investigation as compared to some of the other potential approaches. The PSS procedure of Martin et al. (1980) is an extremely staff-intensive procedure. The results are also more variable; the experimenters suggest the process may be more effective for lower functioning clients. Once more there would be questions of fading out the procedure and normalizing the reinforcement system. In the case of the reinforcement system this would be less of a problem than for Lutzker and White-Blackburn procedures.

Bellamy et al. (1975); Fuller (1976); Lafond, Screvin and Straka (1971) presented models of rate acceleration where multiple environmental manipulations were also made. All the above procedures provided clear improvement, generally well beyond that of other studies. It may well be that Lindsley's (1964) analysis that retarded behavior results from environmental deficits rather than deficits in the individual explains the success of the latter studies.

Staats (1968a & 1971) notes rapid or effortful responding is not reinforcing and is actually aversive; the opportunity to avoid or terminate such responding would be reinforcing. The aversive nature of this responding can be overcome, Staats notes, through reinforcement for such responding. For a child or adult to be successful in work or academic pursuits a history of reinforcement for effortful responding is necessary. It may be that the experiments that have been and will be successful are those that have fulfilled

Lindsley's concept of the adequately designed environment. The fiscal, social and technical economics of such systems may be their main limitation.

In the present experiment none of the manipulated components of modeling showed any consistent therapeutically significant effect in either positively or negatively effecting the rate of client work performance. Not even the most costly and least time efficient method of using staff members as a model showed any impact, though theoretically, given previous findings, it should have produced some positive movement. Modeling as a therapeutic tool given the present results must be seen as being of questionable utility until a clearly therapeutically significant effect is established experimentally. Additionally, it is suggested the Skinner et al. model of imitation be used as the basis for future experimental analyses. Other more reliable and potent technologies should also be explored.

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