THE UNIVERSITY OF MANITOBA

AN EXPERIMENTAL ANALYSIS OF THE EFFECTS OF A SELF-CONTROL TRAINING PACKAGE ON THE BEHAVIOR OF MODERATELY RETARDED STUDENTS

by

Diana H. Simpson

A Thesis

Submitted to the Faculty of Graduate Studies

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ABSTRACT

The use of self-control procedures to program response maintenance and generalization has often been recommended in the recent literature as a potentially promising approach to the problem of developing a clear technology for long-term behavior change. Although previous studies have investigated the effects of some self-control procedures, more information documenting these effects with specific reference to the maintenance and generalization of treatment gains is clearly needed. As well, there is a need for information regarding the impact of self-control with varying subject populations and behavior problems.

During this study, two moderately retarded subjects were exposed to self-control training at different points in time and observations in the classroom and in two generalization areas were carried out. The research design involved four phases, a baseline phase plus two phases where the introduction of self-control training with one subject was staggered over time for two different behaviors, and one phase where self-control training was introduced for one behavior with a new subject. The first, second and third target behaviors were monitored through a follow-up of 4, 3 and 2 weeks respectively.

The findings of this study suggest that the self-control training package was effective in producing marked decreases in all target behaviors for both subjects, with the second and third behaviors showing a downward trend throughout two and three weeks of follow-up, while the first behavior showed an upward trend through four weeks of follow-up. The treatment gains generalized to a new setting for only one behavior.

Furthermore, this study demonstrated that mentally retarded students can acquire self-control responses and that considerable gains in treatment outcomes can occur in spite of low levels of accuracy.

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and sometimes trying course of this work.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

A central concern in the application of behavior modification principles to increase adaptive behaviors or decrease maladaptive behaviors is to obtain the subsequent generalization of demonstrated behavior changes. According to Baer, Wolf and Risley (1968), one important dimension of an applied behavior analysis is that the behavioral change display some generality in terms of durability over time, transfer across settings and to various related behaviors. All too often, however, reports documenting such subsequent generalization of treatment gains are the exception rather than the rule; and those few studies that have done so have yielded inconsistent results. For example, Wahler (1969) reported little generalization between home and school in the elimination of disruptive behaviors through child behavior therapy, while Schwarz and Hawkins (1970) reported a high degree of generalization of delayed reinforcement from one class to another for a sixth grade child. The need for increased attention and more systematic research in this area is clearly emphasized by Kazdin and Bootzin (1972) who pointed out that transfer of treatment gains to extra-therapy settings is not something that can be reliably counted on and that transfer should be planned rather than depended upon as an inadvertent consequence of the program used. There is no doubt that post hoc explanations for the durability and transfer of treatment gains must give way to experimental manipulations which can demonstrate procedures of choice to achieve this goal (Kazdin, 1973; Koegel & Rincover, 1977; Stokes & Baer, 1977). It would appear, however, that clinically applied operant research to date has generally not addressed itself to this task. For example, Keeley, Shemberg and Carbonell (1976), in their review of

operant studies, reported that very few extended beyond short-term behavioral management and that evidence relating to long-term and/or generalizable changes is conspicuous by its absence.

Attempts to program response maintenance and transfer of behaviors to new settings have focused on a number of approaches. First, "natural" contingencies of reinforcement, as opposed to other "more artificial" reinforcers can be utilized in training to maintain behavior. This has been described by Baer and Wolf (1970) as "behavioral trapping". Second, relatives or "significant others" in the natural environment can be trained to carry out or continue the training contingencies in the home or other important setting (e.g., Hall, Axelrod, Tyler, Grief, Jones & Robertson, 1972; Herbert & Baer, 1972; Stokes, Baer & Jackson, 1974). Third, variations in schedules of reinforcement can affect resistance to extinction and hence response durability, though it is unclear at this time just how long and to what limits intermittent reinforcement might effectively maintain behavior. Kazdin and Polster (1973) demonstrated that intermittent token reinforcement maintained social behaviors of a retarded male through five weeks of follow-up, whereas another subject reinforced continuously did not show such maintenance. Fourth, maximizing the similarity between the training setting and significant outside situations where the desired behavior is to occur, as well as reinforcing the desired behavior in a variety of situations and stimulus conditions can enhance generalization (Lowther, Martin & Nicholson, 1978). Finally, it has been suggested that developing self-management or self-control behaviors in clients may enhance response durability and transfer of new behaviors to other settings.

While it is not yet clear precisely what self-control procedure or combination of procedures can reliably produce what specific consequences, this is an approach that holds promise and deserves careful consideration. For example, there is some evidence that children who are trained to self-reinforce maintain behaviors slightly longer than children who are externally-reinforced (Johnson & Martin, 1972). Many references in the literature point to this new area in a suggestive way as a possibly important facet to the generalization problem (O'Leary & Drabman, 1971; Kazdin & Bootzin, 1972; Kaufman & O'Leary 1972; Thoresen & Mahoney, 1974; Jeffrey, 1974; Turkewitz, O'Leary & Ironsmith, 1975). In particular, self control may be of critical value in planning programs for the mentally retarded, where the durability and transfer of treatment gains to a variety of social settings seems especially crucial to increasing public acceptance of these individuals. However, this is an area that remains, as yet, relatively unexplored.

THEORETICAL AND RESEARCH BACKGROUND

The idea of applying behavior modification principles to problems associated with self-control is certainly not new. Skinner (1953) provided a rudimentary conceptual analysis; other writers since then have followed and made significant inroads (e.g., Goldiamond, 1965; Homme, 1965; Watson & Tharp, 1972; Thoresen & Mahoney, 1974).

In place of the traditional concept of self-control as "willpower" or some inner psychic force, the behavioral model of self-control or self-management emphasizes the reciprocal relationship between a person's behaviors and his environment. By arranging specific environmental

conditions, one can predictably control the occurrence of a specific behavior (Goldiamond, 1965). However, the manipulation of environmental conditions can be performed either by some external agent or by the person himself. In the latter case, the act of arranging one's own environment in order to facilitate behavior change is referred to as self-control. Because of the complexity of interacting variables in self-control situations however, Thoresen and Mahoney (]974) emphasize the appropriateness of a continuum classification; one can distinguish degrees of self-control with regard to the relative frequency, form, timing, and magnitude of external versus self-control components.

An important distinction is usually made between the "controlled" and "controlling" responses (Skinner, 1953). The controlled response is the behavior to be changed by altering environmental variables such as response consequences or environmental cues. The act of carrying out those environmental manipulations is referred to as the controlling response. If all behaviors are influenced by their consequences, then this applies not only to the controlled behavior in the distinction made above, but also to the controlling behaviors. They too, like any other behavior, are ultimately maintained by external variables. This interdependence of behavior and environment cannot be overemphasized in self-control.

Self-control strategies generally involve two basic approaches. The first focuses on stimulus control procedures which alter the stimuli that influence the occurrence of a behavior prior to its execution; this would include not only the physical stimuli in the external environment, such as controlling overeating by restricting eating to a few relatively

infrequent, nonentertaining situations (Ferster, Nurnberger & Levitt, 1962), but also "internal" stimulus control such as, for example, self-instructions whereby institutionalized schizophrenics modify what they say to themselves and how they perform by averting maladaptive internal monologues and substituting relevant coping cues (Meichenbaum & Cameron, 1973). The second approach focuses on self-presented consequences following a behavior, and usually involves some combination of self-observation and self-reinforcement or self-punishment. Here too, consequences may involve symbolic or covert activities that play a role in the maintenance of behavior as well as tangible, concrete consequences after a response occurs. Bolstad and Johnson (1972), for example, found that self-reward with points exchangeable for prizes produced considerable reductions in the disruptive behaviors of first and second-grade children. Children who rewarded themselves were slightly more successful in this respect than were children who received only external reinforcement. Though these two approaches are distinguished for purposes of clarity and simplification, most programs and clinical applications of self-control in fact involve complex combinations of the two strategies. Thoresen and Mahoney (1974) provide a detailed and comprehensive review of theory and research findings in this area.

One facet of self-control research in particular seems to suggest potentially promising theoretical and research implications for the problem of generalization. The role of verbal self-instructions and "covert speech" in complex performance has increasingly become a topic of experimental interest. Much of the early thrust in this area came from the Soviet psychologists Luria (1961; 1963) and Vygotsky (1962). They suggested that early in normal development, the verbal instructions

and reactions of external agents, usually parents, control and direct a child's behavior. Later, the child's own overt speech and self-talk become a regulator of his actions, and finally, these self-statements become covert or inner speech and assume a regulatory role.

From this hypothetical sequence, and their own observations and study of the literature, Meichenbaum and his colleagues developed a training paradigm for the development of self-control in impulsive children which paralleled some of the above elements in children's internalization of speech (Meichenbaum & Goodman, 1971). The training sequence proceeded as follows:

1. first E performed a task while talking to himself out loud while S observed (modeling);

2. then S performed the same task while E instructed S out loud (overt external direction);

3. next, S performed the task while repeating the instructions to himself aloud (overt self-direction);

4. next, S performed the task while whispering the instructions to himself (faded overt self-direction);

5. S performed the task while guiding his performance via private speech (covert self-instruction).

The verbalizations which E modelled included: (a) questions about the nature of the task (e.g., "What is it I have to do?"), and answers to these questions in the form of cognitive rehearsal; (b) focused attention plus reponse guidance (e.g., "Be careful ... draw the line down."); (c) self-evaluative coping skills (e.g., "That's okay ... even if I make an error I can go on slowly."); and (d) self-reinforcement (e.g., "Good, I'm doing fine ...").

The training procedure resulted in significantly improved performance on various dependent measures such as Porteus Maze scores,

performance IQ on the WISC, and cognitive reflectivity as identified by scores on the Matching Familiar Figures Test. These improvements were significantly greater than those obtained in no-treatment and attentional control groups and were evident in a one-month follow-up.

Further controlled laboratory studies explored the contribution of several of the above training components. For example, it was found that cognitive modeling alone was not as effective as cognitive modeling plus self-instructional training in the actual rehearsal and personal use of private speech (cf. Meichenbaum, 1971b). Another study on snake avoidance (Meichenbaum, 1971a) indicated that exposure to coping behavior plus coping self-verbalization models (e.g., snake approach with marked hesitancy and occasional physical withdrawal plus description of initial fears, self-instructions to take deep breaths and relax) was more effective in reducing avoidance behavior than exposure to nonverbal coping performances alone or exposure to mastery models (e.g., fearless and unhesitating snake approach and mastery self-verbalizations). Previous research on vicarious learning (Bandura, 1969; 1971) had suggested the importance of the coping versus mastery distinction and the possiblility that subjects would more likely imitate the behaviors of coping models due to their greater similarity to the observer.

In addition to the above-mentioned applications of self-instructional training, the strategy has also been applied to the treatment of test and speech anxiety, with indications of impressive improvements on dependent measures such as self-reports, actual test performances, and changes in gradepoint average (Meichenbaum,1972; Sarason, 1973; Norman, 1974).

Finally, one of the most intriguing and clinically impressive

applications of self-instructional training studied its impact on the attention, thought and language behaviors of institutionalized schizophrenics (Meichenbaum & Cameron, 1973). Performances of a self-instructional training group on "sick talk" during a standardized interview, proverb abstraction, digit recall and rated perceptual integration in ink-blot responses were compared to those of an equivalent attentional control group. Assessments were made by an experimenter who was blind to subjects' condition assignments. Measures of rater reliability on dependent measures ranged from 98.2% to 99.1%. Self-instructional training produced significant decreases in "sick talk" and was related to improvements in proverb abstraction, perceptual integration, and digit recall under distraction conditions. Follow-up three weeks later revealed not only that treatment gains were maintained, but that the self-instructional group actually improved relative to the control group. Differences at follow-up on frequency of "sick talk", for example, were statistically significant at the .0005 level.

Although self-instructional training has demonstrated tentative promise, further inquiries and controlled research are sorely needed. Meichenbaum (1974) suggests the possible operation of at least the following components:

1. didactic presentation and guided self-discovery of the role of self-statements in subjective distress and performance inadequacies;

2. training in the fundamentals of problem solving (e.g., problem definition, anticipation of consequences);

3. training in the discrimination and systematic observation of self-statements;

4. graduated performance assignments;

5. explicit suggestions and self-reinforcement for the modification of self-statements along the lines of "coping" adaptation and performance-relevant attentional focusing;

6. structured modeling of both overt and cognitive skills;

7. modeling and encouragement of positive self-evaluation (self-reinforcement) and

8. depending on the treatment package employed, relaxation training combined with the use of coping imagery in a modified desensitization procedure.

Though self-instructional training has demonstrated some tentative promise, there is a scarcity of the controlled inquiry needed to help unravel questions about the component features of self-instructional training, its maintenance and transfer effects, and its possible differential effects with regard to varying behavior problem categories and varying subject populations. Margolis and Shemberg (1976) reiterate this last point in attempting to account for their failure to replicate the Meichenbaum and Cameron (1973) study.

From a theoretical viewpoint, a basic premise underlying self-instructional training is that internal phenomena such as thoughts, images and physiological reactions can be viewed as responses similar to external behavior, and as such may serve similar important functions as antecedents that cue the occurrence of other behaviors in a response chain or as consequences of other actions. This presumed correspondence between the principles governing overt and covert behavior has been termed the continuity or homogeneity assumption and is tentatively supported by several lines of evidence (e.g., Miller, 1959; Barber & Hahn, 1964; Bandura, 1969; Mahoney, Thoresen & Danaher, 1972). In this context,

the problem of generalization of treatment gains can be viewed in part as a problem of stimulus control. If self-statements such as thoughts and images represent early elements in a lengthy response chain that gradually becomes overt, then can this critical mediating or cueing function of internal events be taken advantage of to program internal adaptive versus maladaptive coping cues, such as described earlier, that might enhance the maintenance and transfer of desired overt behaviors?

In summary, the preliminary self-control research reviewed thus far suggests that bringing internal events into the realm of applied science offers a potentially useful and excitingly comprehensive perspective. In fact, Bandura (1969) and others (e.g., Kanfer & Phillips, 1970; Staats, 1972; Thoresen & Mahoney, 1974; Mahoney, 1974) have argued convincingly that covert processes are not only useful but essential in the understanding and control of complex behavior. A comprehensive approach to the problem of generalization may prove to require an emphasis on covert or cognitive determinants of behavior as well as overt or environmental determinants. To ignore either one of these significant dimensions to the exclusion of the other may perhaps prove to be both premature and unjustified. For the present, it first remains necessary to demonstrate an effect in utilizing such a model for programming generalization; future inquiries may then focus on isolating the contributing influences of various components.

A central concern in the present study, therefore, was the question of whether or not any positive changes related to self-control training might occur, and if so, to what extent would these effects generalize

to settings other than the training setting. In addition, information is clearly needed about the impact of self-control skills with varying subject populations and behavior problems. Very little self-control research generally has been carried out in behavior modification programs for the mentally retarded. However, the feasibility of using these techniques with the retarded is suggested by several recent preliminary studies. Frederiksen and Frederiksen (1975) have reported the effectiveness of contingent self-administered token reinforcement in the control of disruptive and on-task behavior of educable mentally retarded children in a junior high school over an eleven-week period. Helland, Paluck and Klein (1976), in a comparison of self and external reinforcement with mildly mentally retarded adults, found self-reinforcement in the form of verbal praise and self-administration of a monetary or candy reward on a fixed ratio schedule to be at least as effective as external reinforcement in improving performance on a collating task. In addition, Nelson, Lipinski and Black (1976) demonstrated that retarded institutionalized adults with IQ's around 50 were capable of self-recording their behavior, given a very structured situation, with a reliability equivalent to that of college students and that such self-recording was related to an increase in the frequency of desirable behaviors (conversation in the dining room, participation in lounge activities and tidiness of bedrooms). Litrownik, Freitas and Franzini (1978) found that trainable mentally retarded children (IQ's from 30 to 50) who were exposed to a brief 1-hour demonstration-training program were able to acquire, retain and transfer self-recording skills involving a discrimination between the type of task completed (e.g., recording the matching of items involving parts of the body while not recording

the matching of items involving shapes) and the consequences of their behavior (e.g., recording a bowling score of 10 while not recording scores of 1 or 5). Finally, Guralnick (1976) has reported the effectiveness of self-instructional training with educable mentally retarded children in facilitating performance on a matching-to-sample task, and a comparison with a control condition indicated that the self-instruction group was the only one in which a significant increase in accuracy from pre - to post - testing occurred. It appears at least plausible that mentally retarded children may well benefit from a training procedure specifically aimed at programming response maintenance and generalization via self-control techniques. An additional concern in the present study, therefore, was to attempt to add to the existing information on self-control, especially with respect to the acquisition of such skills in moderately retarded (i.e., TMR) students (IQ's 30 to 50) in an uncontrived, naturalistic setting.

In brief, the purpose of this study was to examine the behavioral effects and utility of a self-control training package designed for relatively easy use by teachers in a school setting in modifying the behavior of two moderately retarded students. More specifically, the goals were: (1) to apply prompting, modeling and reinforcement procedures to (a) teach subjects to self-record their socially undesirable behavior, (b) train subjects to provide themselves with verbal commands or self-instructions regarding such behavior and to respond to them appropriately, and (c) teach subjects to appropriately self-reinforce their responses; and (2) to investigate the effects of the self-control behaviors so taught, especially with respect to (a) the maintenance and (b) setting

generalization of any desired changes observed in the target behaviors.

METHOD

Subjects

Two students enrolled in the school program at the St. Amant Centre,[1] participated in this study. Subjects were selected by asking the teaching staff at the school to refer any individual students with a specific behavior problem whom they felt might benefit from a self-control program. Of five students initially referred, two were finally selected and three rejected on the basis of several criteria. These included the presence of a high frequency versus low frequency behavior problem, the ability to imitate and follow simple directions and at least minimal expressive language involving the use of two or three word combinations. In addition, both subjects finally selected exhibited a level of retardation which did not exceed the moderately retarded range and did not include additional complications such as autistic behaviors or major sensory or motor impairments. Specific information regarding these individuals can be seen in Table 1.

Insert Table 1 about here

In addition to this research, both subjects also participated in an on-going occupational therapy program in the school involving the use of a token reinforcement system in a workshop setting.

Setting

This study was conducted in the school section of the St. Amant Centre where three areas were utilized. These included two classrooms,

Table 1. Summary table of Subjects

Subject	Sex	Age (yrs)	Level of retardation	Length of institutionalization	Age at last assessment	Developmental Quotient *(Yale Development Schedule)
A	Male	13	Low moderate	4 years	10 yrs - 10 mos	30% or 3 to 3½ yr level
B	Male	9	High moderate	1 year	7 yrs - 6 mos	65% or 4½ yr level

* This was the only psychometric information available from institutional records.

a TV room and a workshop area, which shall be referred to as the training classroom, the home classroom and the generalization areas respectively.

Training Classroom. This area consisted of a standard-sized classroom used by the school as a resource room for storing various equipment and for working one-to-one with individual students. Within this room there were also several school desks and chairs. Two of these were set up to one side of the room to allow for the placing of research equipment close at hand on one desk and to allow the experimenter and one subject to sit diagonally across from one another at the second desk during individual self-control training sessions.

Home Classroom. This area was a standard-sized classroom with a large desk for the teacher situated in one corner, and 8 small school desks and chairs set front to front in two rows of four towards the middle of the room. An additional 8 small school desks and chairs were placed in a half-moon at the back end of the room. These constituted the major work areas for the eight students composing this class, including one student confined to a wheelchair and the two subjects participating in this research. Other basic classroom equipment such as blackboard, books, learning materials, sink and adjoining bathroom completed the layout of the home room. As there were no one-way windows in this particular room, observations were made by observers who sat on chairs in the corner at one end of the room or the other depending on which work area was being utilized by the teacher.

Generalization Areas. The TV room and the school's workshop, situated on a lower level, were used for this area during those times

when films were being shown in the TV room to approximately 40 students and 6 to 8 school staff, or when art or manual work skills were being taught to the eight students seated at several small work tables with anywhere from 5 to 8 staff and volunteers normally assisting. Observations were made by observers who sat in chairs at least 8 feet away but in a variety of locations depending on where subjects were situated or moved.

Apparatus

The major equipment used in this study consisted of two audio-tape recorders with attaching earplugs, two pre-recorded audio-tapes used by the observers in the home classroom and generalization areas to indicate observational intervals, and several blank audio-tapes for recording individual treatment sessions in the training classroom. As well, papers, pencils, erasers, and work sheets supplied by the teacher and involving the identification of sets of numbers were on hand in the training classroom. Finally, two 3-feet by 2-feet blue and yellow cardboard behavior charts marked off in half-inch squares and with pictures of Ronald McDonald pasted below a red goal line at the bottom, as well as two peg boards and pegs were available in the training classroom and afterwards in the home classroom.

Dependent Variables

The dependent variables in this study were those responses defined by the school staff and experimenter as socially undesirable because of their distracting and unpleasant appearance and/or their unlikely public acceptance as desirable behavior in society at large. These included tongue chewing, tongue protruding, spitting, head jerking and hand clapping. While not necessarily clinically significant, the modification

of these kinds of behaviors seemed crucial to increasing public acceptance of mentally retarded persons. The specific behavioral definitions used for Subject A were:

Head Jerking - quick up and down vertical movement of the head with the head thrown up and back, then moved down with a jerk toward the floor such that the chin moves down to the chest bringing eye level away from the vertical. Do not record instances of nodding the head where the up and down movements of the head are so slight that the face and eye level remain relatively vertical, as for example in nodding affirmatively in answer to a question or instruction or comment from another person. Record any one or more occurrences of head jerking as H for that observation interval, regardless of the number of responses observed.

Tongue Chewing - the tongue protruding beyond the lips so that the tip is clearly visible, either with or without chewing motions and/or chewing motions without the tongue being observable. Do not record instances where the tongue is stuck out and immediately returned in to the mouth within 2 seconds or less. Record any one or more occurrences of the above components as T for the observation interval, regardless of the number of responses observed or whether they occur singly or simultaneously.

Hand Clapping - moving the arms in and out in such a way that the hands come together palm to palm and form a clapping sound. Do not record instances of hand clapping

where the subject has been instructed to do so, or where hand clapping is the expected social reponse, as for example in clapping out a rhythm, or in expressing appreciation at the end of a concert or speech or presentation. Record any one or more occurrences of hand clapping as C for that observation interval regardless of the number of responses observed.

The specific behavioral definition used for Subject B was:

Tongue Sticking Out - the tongue protruding beyond the lips so that the tip is clearly visible for a period of at least 3 seconds and/or saliva being pushed out of the mouth and allowed to drip down toward the chin. Record any one or more occurrences of the above components as T for that observation interval, regardless of whether they occur singly or simultaneously.

Independent Variable

The independent variable in this study consisted of the self-control training package involving the use of prompting, modeling and reinforcement procedures to develop (a) self-recording, (b) self-instruction and (c) self-reinforcement.

General Procedure

The specific procedures for both observation and training sessions were as follows:

Observation Procedure. Observation data from the homeclassroom and generalization areas were recorded by the author and a volunteer observer who had been a former employee of the St. Amant Centre with past work experience both in the residence and as an occasional

assistant to teachers in the classroom. Data sheets were provided daily, with 120 five-second observe intervals marked off. Observers used the behavioral definitions and codes previously defined. Any occurrence of the target behavior in a five-second observe interval was recorded and coded during a five-second record interval. If none of the target behaviors were observed, this was recorded as zero. At the end of each session, adding the number of intervals for which a response was recorded, dividing that by 120 and then multiplying by 100 provided a measure of the occurrence of each target behavior; i.e., a simple percent of observation intervals during which each response was observed. Except for a minimum of three observation sessions per week for each subject, during which both observers recorded concurrently in order to acquire interobserver reliability (IOR) scores, each observer separately recorded different assigned subjects, with observation sessions mixed between subjects and observers. IOR scores for the home classroom and the generalization areas were calculated by dividing the number of agreed-upon observations by the number of agreed-upon plus the number of disagreed-upon observations and multiplying that figure by 100. During those IOR sessions when both observers recorded each subject concurrently, the author sat behind and slightly to one side of the volunteer so that visual contact with the other's records was minimized but the observers were still able to have similar lines of vision, and were able to hear the tape recorder through attached earplugs. In all situations, the importance of recording independently and ignoring the many potential sources of distraction was stressed. If one

observer's line of vision became blocked at any time, stopping the tape recorder signalled the other to stop recording until a clear view of the subject was re-established, and starting the tape recorder again while calling out the number of the next observation interval signalled the resumption of the observation session.

Prior to collecting data, it was necessary to ensure that each observer's data was reliable. In order to accomplish this, the author discussed and developed the procedure and definitions with the volunteer. Next, the author and the volunteer practiced observing and recording the responses of both subjects in each of the areas utilized in the study. This continued until the IOR was over 80% on three consecutive fifteen-minute observation periods. This training and refining of procedures and definitions took six days. The data collected during this time was not used for the study. During the study a total of 109 IOR observations were carried out. The average IOR scores for observations of Subject A for head jerking, tongue chewing and hand clapping were 88.97%, 86.22% and 95.11% respectively; the average IOR score for observations of Subject B for the tongue sticking out was 89.87%.

Self-control Training Procedure. Training for each subject was carried out by the author, and involved two 40-minute sessions in the training classroom followed by one 30-minute session in the home classroom. The only exception to this was during training with subject A to develop self-control for a second behavior; i.e., tongue chewing, where training involved one 40-minute session in the training classroom followed by one 30-minute session in the home

classroom, omitting the first introductory session used earlier in developing self-control for head jerking. Cue cards, prepared in advance by the author, were used during all training sessions to standardize the procedure, and all sessions were recorded on audio-tape. For the first training session, the author, sitting alone with the subject at a small desk in the training classroom, first worked to (a) introduce in a positive way the author's intention that they work together over the coming weeks and to establish and reinforce the subject's agreement to such a plan, (b) define the target response by modelling the behavior for the subject and then having the subject demonstrate the response, and (c) provide evaluative statements regarding the undesirability of such behavior and the abilities of the subject to learn new responses. The author then brought out a wrist-counter of the standard type used by golfers to record scores, and introduced the idea that this was a special watch that subjects could learn to use to help them achieve their goal. Subjects were allowed to examine the counter while the author demonstrated how it worked. Throughout this time the author continuously stressed that subjects would be lucky to use the counter but that they must learn to use it only the right way. Next, the author demonstrated the self-control procedure by telling the subject she would pretend to be the subject in class with his teacher and the author then modelled the appropriate use of the counter; i.e., the author took a picture book, engaged in the target behavior, pressed the counter and verbalized the self-instruction and self-reinforcement statements (e.g., "You can stop jerking your head. Good boy.") for three consecutive trials.

Following this, the subject was allowed to wear the counter and instructed to demonstrate its appropriate use by pretending to be doing work in class with his teacher. If the target response did not occur spontaneously, the subject was prompted to emit the behavior, and then prompting and reinforcement were used to provide practice in the self-control procedures for four consecutive trials. Finally, the pegboard and pegs were shown to the subject, and the subject was instructed to give himself 4 pegs for using the counter correctly four times. It was explained that the subject could work to earn these pegs by using the counter the right way and could save them up to cash them in for something special (back-up reinforcers included a choice of a variety of supervised activities and some edibles, such as 10 minutes to use the tape recorder and hear themselves speaking, 10 minutes of punching in numbers on a pocket calculator, 10 minutes of playing cards with the author, going for a coke in the staff cafeteria with the author and eating a piece of candy). Subjects were then given the opportunity to cash in their pegs for one of two reinforcers, with the exchange value for either reinforcer pre-set at 4 pegs for this training session. After training, the price of back-up reinforcers and the number of possible choices was gradually increased such that by five days post-training subjects required 10 pegs in order to obtain any one of 5 back-up reinforcers illustrated graphically on a cardboard chart.

For the second training session, the author, again sitting alone with the subject at a small desk in the training classroom, first reviewed the treatment goal by asking, "Now what is it we're going

to learn to do?" and then gave the subject his wrist counter to wear, stressing how nice it was and how important it was to use the counter only the right way. Having introduced the procedures for self-recording, self-instruction and self-reinforcement in the first session, the goals here were to emphasize the importance of accuracy and to provide practice in the correct use of the procedures. This occurred in two stages. First, the author modelled the self-control behaviors while subjects were instructed to observe carefully and count along also. Subjects were told the author would pretend to be the subject in class doing school work (identifying sets of 2 by drawing a circle around the appropriate groupings on a work sheet, or drawing shapes using a plastic stencil and cutting out the shapes) and that she would press her counter every time she emitted the target behavior while verbalizing in a low voice the appropriate self-instruction (e.g., "Stop chewing your tongue.") and self-reinforcement (e.g., "Good boy."). Subjects were reminded to observe carefully and to record the behavior on their own counter also. Prompting and reinforcement were used where necessary, and this continued until the subject correctly recorded, without prompting, at least 4 consecutive occurrences of the target response. At this point, scores were then compared for agreement and enthusiastic verbal praise was given for counting right. Next, subjects were then asked to complete the same classroom task the author had just engaged in, and to similarly practice counting their own behavior by pressing their own counter every time the specific target response in question occurred. Again, prompting and reinforcement were used where necessary

and practice continued until the subject correctly recorded, without prompting, at least two consecutive occurrences of the target response, while verbalizing in a low voice the appropriate self-instruction (e.g., "Stop jerking your head.") and self-reinforcement (e.g., "Good boy."). Throughout the session, the author did not press her counter following the occurrence of the target behavior until after the subject had pressed his counter or four seconds had elapsed, at which point the subject was prompted to carry out the procedure. Since the counter made a clearly audible clicking sound when pressed, it was unnecessary for the author to look directly at the subject to observe visually if the counting response occurred. Thus, the only reliable cue for the subject to respond to was the occurrence of the specific behavior, and not the hand or eye movements of the author. At the end of this session, subjects were shown their own individual behavior charts which were then posted on the hallway wall just outside the door of their home classroom. It was explained that they would chart with the author each day, putting an X in squares along a vertical column for each time they pressed their counters that day and remembered to tell themselves to stop the target behavior in question. The author then recorded with each subject the number of X's for that day, and a red line was drawn across the top of the column with a red wide-tipped felt pen. Subjects were then asked to identify the Ronald McDonald figure pasted below a red line at the bottom of the chart, and it was explained that when they learned to press their counter and remind themselves to stop the behavior in question, their X's would start to go down, and when their red line

moved down to touch the red goal line at the bottom, they would earn an outing to McDonald's for lunch with the author. Thereafter, charting occurred once per day with the author just before the afternoon recess period. Each time, the subject was asked, "Did you use your counter the right way?" and the author checked to see the number recorded on it and instructed the subject to give himself 3 pegs if the target behavior had been observed to occur that day at a rate of 5% or more and the figure on the wrist counter indicated it had been pressed, or if the target behavior showed a rate of less than 5% for that day, no matter whether the counter showed a score of zero or more. The appropriate number of X's were then entered on the chart, and the subject was then asked, "Did your X's go up or down today?" and an additional 3 pegs were earned if the subject's red line moved down from the level of the previous day. These generalized reinforcers were accompanied by warm and enthusiastic praise. Back-up reinforcers were made available at this time whenever the subject had accumulated the required number of pegs.

The final training session occurred in the home classroom on the second day of self-control training. Before the start of class, and every morning thereafter, the subject was given his counter with instructions to carry out the self-control procedure in class whenever the target behavior occurred. The subject was then given one practice trial during which the self-control sequence was carried out, and the subject then returned to be seated with the rest of his class. Following this, the author sat behind and to the side of the subject for a 30-minute period during which the subject was involved in

regular classroom activities along with his teacher and classmates. If the target behavior occurred, and the subject carried out the self-control procedure appropriately, the author reinforced immediately with warm praise. If the target behavior occurred but the subject failed to carry out the self-control responses within 4 seconds, the author prompted the subject to do so, gradually fading the prompts until one successful unprompted occurrence of the self-control sequence was reinforced with enthusiastic praise. Thereafter, no further prompting was provided, but continuous reinforcement was maintained until shifting to intermittent reinforcement following three successful, unprompted occurrences of the self-control sequence or the 30 minutes of the training session had elapsed. Thereafter, the only external controls over subjects' behavior involved the author's feedback at charting times, when pegs for using the counter the right way were not to be provided if the counter showed a score of zero while the rate of the target behavior for that day was above 5%. As well, the general cooperation of the teaching staff was enlisted, and those staff who had regular daily involvement with subjects were instructed to (a) provide warm praise at any time they should spontaneously observe any self-control behaviors, (b) remove the counter if the subject misused it after one warning (e.g., clicking it many times in succession in the absence of the target behavior), and (c) prompt the self-control sequence by saying, for example, "_____, (subject's name) you jerked your head; press your counter.", at any time they should spontaneously observe the target behavior in question without the occurrence of the self-control sequence.

Research Design

The effect of the self-control training package on target behaviors was analyzed by using a multiple baseline design across behaviors and subjects. For discussion of this design, see Hersen and Barlow (1976). All target behaviors were scored simultaneously throughout the course of the study and the introduction of the training package was staggered over time across behaviors and subjects. The experimental phases were as follows.

Phase I (Baseline). Subjects were observed at work in the home classroom throughout 20-minute observation periods that occurred once, twice or three times daily (Monday to Friday), depending on the school routine, variations in the classroom schedule and the nature of the work or activity students were engaged in. For example, gym periods, recess periods or special events were automatically excluded because of the difficulty often posed of obtaining reliable data. As much as is possible in a naturalistic, uncontrolled situation, these observation periods were carefully selected so as to try and maintain consistency in their timing and setting throughout all phases of the study. Reliability checks on observations in the home classroom were carried out for each subject at least twice a week throughout the course of the study. In addition, generalization observations to observe target behaviors in other settings were similarly carried out, with reliability checks occurring at least once a week throughout all experimental phases.

Before the start of the baseline phase, subjects had experienced six days of seeing both observers coming in and out of the classroom

with their data sheets and tape recorder to practice observing and recording. The first two days, by arrangement with the teacher, observers said "Hello" and then the author simply informed the group that they had work to do and did not wish to be disturbed by saying: "We have some important work to do, Mrs. _____; could we just work alone over here in the corner?" The author instructed the volunteer observer to ignore any approaches students might make and to avoid eye contact, smiles or any similar social interaction. For five minutes, both observers sat with eyes down and pens and data sheets in hand before the observation sessions commenced. Thereafter, observers came in and out of the classroom as unobtrusively as possible and with no further formal explanations to the group.

Phase II (Self-control Training with Subject A for Head Jerking). This phase was concerned with the use of prompting, modelling and reinforcement to establish self-control behaviors with subject A for head jerking. Conditions for subject A for tongue chewing and hand clapping and for subject B for sticking the tongue out remained as for baseline.

Phase III (Self-control Training with Subject A for Tongue Chewing). This phase was concerned with the use of prompting, modelling and reinforcement to establish self-control behaviors with subject A for tongue chewing. Observations of subject A for head jerking continued in order to monitor any effects of the self-control training, especially with respect to long-term maintenance and setting generalization. As well, because a third behavior for this subject, i.e., hand clapping, dropped from an average of 4.52% to 2.18% over 13 days of

baseline, then dropped further to an average of .35% following self-control training for head jerking, observers continued to monitor this behavior, but self-control training for this third behavior was not instituted as planned. Conditions for subject B for sticking the tongue out remained as for baseline.

Phase IV (Self-control Training with Subject B for Sticking the Tongue Out). This phase was concerned with the use of prompting, modelling and reinforcement to establish self-control behaviors with subject B for sticking the tongue out. Observations of subject A for head jerking, tongue chewing and hand clapping continued throughout this phase and for five days following day 2 of self-control training with subject B.

The criteria for changing phases included: (a) a minimum of six data points over 5 consecutive days for any one phase, (b) the presence, during baseline, of a stable rate of behavior or a trend in the data in the opposite direction from that desired and (c) as much as possible, equal numbers of data points and experimental days between treatment phases.

RESULTS AND DISCUSSION

The results of this study essentially support the feasibility of using a self-control model in training programs for mentally retarded students, but with some reservations and qualifications. Figure 1 shows the data collected from this study.

Insert Figure 1 about here

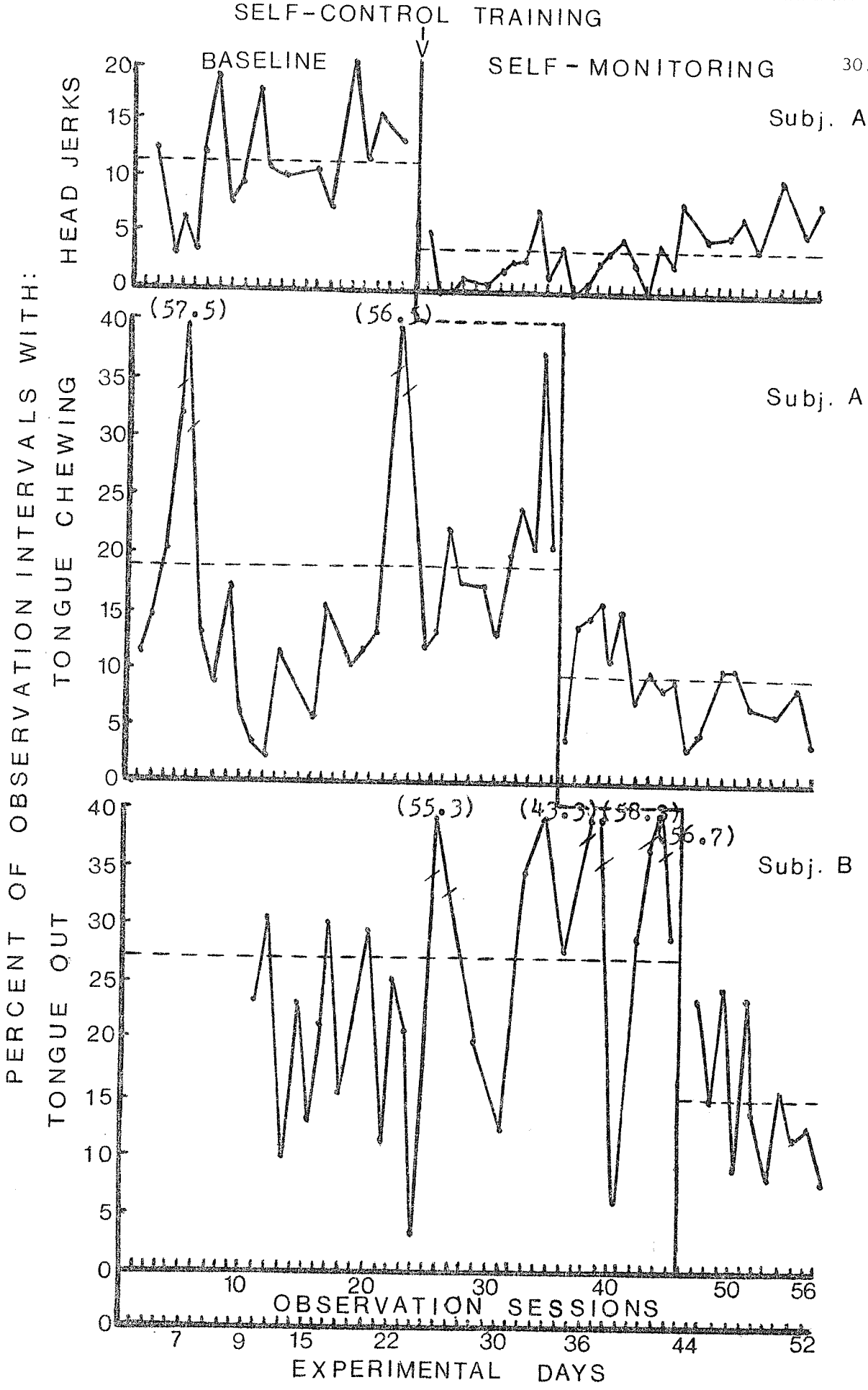

Figure 1. Observation data of target behaviors in the classroom.

Visual inspection of the data showed clear drops in the levels of target behaviors following self-control training. For Subject A, the level of head jerks dropped from an average of 11.14% during baseline to an average of 2.34% over 7 days following the first day of self-control training, while levels for tongue chewing and for sticking the tongue out continued to remain high and on an upward trend during this time. However, response levels for hand clapping declined during baseline from an average of 4.52% during the first week of baseline to an average of 2.37% during the remaining baseline period, and then showed a further decline following the introduction of self-control training for head jerking to an average of .35% for the remainder of the study. While this might suggest that the effects of self-control training for head jerking generalized to a second behavior; i.e., hand clapping, the low rate of hand clapping and the downward trend evident during baseline make it difficult to draw any strong conclusions in this regard. In addition, while response levels for head jerking were clearly maintained at a lower level throughout the course of the study, claims regarding long-term maintenance of behavior change via self-control must be held with some reservation, given the upward trend evident in the follow-up data for head jerking, where the response level increased from an average of 2.34% for the first week and a half following self-control training to an average of 4.06% for the remaining three weeks of follow-up.

The data for Subject A for tongue chewing, with response levels also showing a decline from an average of 18.45% during baseline to an average of 10.34% over 7 days following the first day of self-control

training, while response levels for subject B continued to remain high and on an upward trend at this time, essentially supports the demonstration of experimental control. A similar decline in target behavior for Subject B., with response levels dropping from an average of 27.26% during baseline to an average of 15.33% following self-control training provides some external validity by replicating the effect with a new subject. However, the data here also bring out some new ambiguities. Unlike the upward trend evident during follow-up for head jerking, the data for tongue chewing for Subject A and for sticking the tongue out for Subject B show a definite downward trend throughout the course of follow-up. Tongue chewing continued to decline from an average of 10.34% for the first week and a half following self-control training, to an average of 6.89% for the remainder of the study. Similarly, response levels for Subject B declined from an average of 18.74% for the first week following self-control training, to an average of 11.23% for the second week of follow-up.

Finally, the data regarding setting generalization of treatment gains is ambiguous. Levels of head jerking for Subject A showed a slight decline in generalization areas immediately following the introduction of training, but a strong upward trend in the follow-up data, and a high number of overlapping data points suggest the effect, if any, to be short-lived. These problems in the data, coupled with the low rate of occurrence of head jerking in generalization areas, make any conclusions difficult. Response levels for head jerking in generalization areas declined from an average of 5.5% before training to an average of 3.56% for the remainder of the study. However, with

respect to tongue chewing for Subject A, response levels showed a much clearer and stronger decline in generalization areas following the introduction of training, with tongue chewing occurring at a high and stable level, averaging 30.33% during baseline, then dropping to an average of 9.5% for the remainder of the study. The data regarding setting generalization of treatment gains for Subject B is inconclusive. Response levels for sticking the tongue out in generalization areas declined from an average of 30.28% before training to an average of 26.66% for the remainder of the study.

The substantial decrease in target behaviors following the introduction of the self-control training package occurred in spite of the fact that the self-control responses (i.e., self-recording, self-instruction, self-reinforcement) of both subjects appeared to occur at very low rates in the home classroom and generalization areas. This was difficult to assess because continuous observation of both subjects throughout the school day was not possible, but observers recorded very few responses during observation sessions (frequencies ranged from 0 to 3), although counter scores at charting times ranged from 0 to 13 for Subject A, and from 0 to 15 for Subject B. For both subjects, target behaviors often occurred in the absence of the self-control sequence. This raises questions about the relative importance of the role of accuracy of self-recording in the effectiveness of self-control programs, and points to a need for further research to assess this variable. The data from this study suggests considerable gains in treatment outcomes can occur in spite of very low levels of accuracy.

The findings of this study are also of interest because of the information it provides with respect to the use of self-control procedures with this particular subject population. It would appear that given a limited investment of training time, moderately mentally retarded students can be taught to emit self-control responses and to engage in these responses in a naturalistic setting, although these responses did not develop to a high level of accuracy. This may be due in part to the nature of the target behaviors subjects were required to self-record, where the cues subjects would have to respond to for pressing the counter are proprioceptive stimuli and not some external cue such as for example, in Litrownick et al. (1978), where subjects recorded bowling scores of 10 while not recording scores of 1 or 5. More information is needed regarding the impact of self-control training with varying behavior problems in naturalistic, uncontrolled settings.

In summary then, the results of this study support the potential feasibility and utility of a self-control model in training programs for mentally retarded children. Further controlled inquiry is clearly needed though to help identify and isolate the differential contributions of different component features.

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FOOTNOTES

1. The St. Amant Centre is a provincial learning and residential institution situated in Winnipeg, Manitoba, Canada.