TOILET TRAINING THE SEVERELY RETARDED; AN
APPLICATION OF OPERANT TECHNIQUES

by

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TOILET TRAINING THE SEVERELY RETARDED; AN APPLICATION OF OPERANT TECHNIQUES

By

David Kent Giles

ABSTRACT

The purpose of this study has been to evaluate the use of operant conditioning techniques in toilet training severely retarded subjects within their usual institutional environment.

Five individuals from a cottage of severely retarded males were selected as subjects. Records of the elimination response rate were kept during a baseline period and throughout the application of the procedure. An increase in the rate of appropriate elimination behavior following the application of reinforcement procedures indicated that the techniques were effective in generating this class of self-care behavior.

Appropriate elimination behavior was followed by positive reinforcers, such as food, drink, hugs, etc. In instances where exhaustive use of positive reinforcement procedures produced no results, positive reinforcement procedures were used in conjunction with the
presentation of negative reinforcers contingent upon inappropriate behavior. The negative reinforcers primarily consisted of forms of physical restraint. The specific procedure varied between Ss.

By the end of an 8-week period all five Ss were eliminating consistently in the toilet. The rate of acquisition varied widely between Ss.

The results of this study offer further evidence that operant conditioning techniques may be an effective means of establishing self-care behaviors in institutionalized severe retardates.
INTRODUCTION

In the past, various labels (i.e., moderate retardate) have been applied to individuals evidencing varying degrees of retardation. This labeling has been based on the assumption that such labels explain the obvious defects and limitations in the behavioral repertoire of retarded individuals. Lack of reading skill, for example, often has been attributed to the fact that a child was retarded rather than to environmental factors, such as the lack of an effective teaching technique. The labels borderline, mild, moderate, severe, and profound carry connotations of an absolute limit in potential. An individual with few social skills who has been unable to carry out rudimentary self-care behavior by mid-childhood usually has been labeled severely retarded. Generally, he was institutionalized and given custodial care with no further effort made to increase his repertoire. When behaviors, such as feeding, toilet usage, speech, etc., have failed to develop by a given age, it frequently has been concluded that further training would produce no significant change in the behavioral repertoire.

Headrick (1963) and Bijou (1963) suggest that retardation be thought of not as a theoretical construct, such as mentality, but rather as a state of functioning generated by adverse histories; the failure of
coordination between stimulus and response function. One cannot infer that an organism is incapable of a given behavior merely because it has failed to emit that response. The technique for modifying that behavior may lie undiscovered. The traditional levels of mental deficiency may be viewed not as final entities but as a reflection of the degree of success of conventional training procedures. The concern is to find a method of teaching specific behaviors that will enable retarded individuals to interact more successfully with their environment.

One approach that would appear to be appropriate to the modification of behavior in retardates is that of operant conditioning. Operant conditioning refers to the strengthening of a stimulus–response association by following the response with a reinforcing stimulus. Stimuli that follow a response and increase the likelihood that a given behavior will occur again are called positive reinforcers. Stimuli that, when removed following a response, increase the likelihood that a given behavior will occur again are called negative reinforcers. Behaviors that are functionally related to their consequences in the environment are called operants. Operant behavior is modified by one of four consequences when it (1) produces a positive reinforcer, (2) removes negative reinforcers, (3) produces negative reinforcers, or (4) removes or avoids positive reinforcers. Two of these consequences—the production of positive reinforcers and the removal or avoidance of negative reinforcers—increase the frequency of the operant response. The
remaining two consequences—the production of negative reinforcers and the removal or avoidance of positive reinforcers—suppress the operant response rate (Bijou and Baer, 1961).

While the technique of operant conditioning has been used primarily with lower organisms in the past, investigators recently have begun applying it as a means of modifying deviant behavior in human populations. Ferster and DeMyer (1961) found operant conditioning useful in changing the behavior of previously inaccessible autistic children. Wolf, Risley, and Mees (1964) also successfully applied operant procedures to the behavior problems of an autistic child. Sherman (1965) found that reinforcement techniques could be used to reinstate verbal behavior in mute psychotics. Bensberg, Crowell, and Cassell (1965) demonstrated that self-help activities could be taught to the profoundly retarded by behavior-shaping techniques. They further point out that since operant conditioning has been very successful with non-language organisms, it is an excellent procedure to bring about the initial modification of behavior in the retardate.

Traditionally, retardates have been housed in large institutions with the more severely retarded individuals segregated into special units where they receive custodial or infant care. Observation of these individuals reveals little purposeful behavior. Typically, they are unable to bathe or dress themselves and show only minimal skill in feeding themselves. Speech is absent or reduced to an ineffective means of
dealing with the social environment. One of the most distasteful features of the care of such individuals is associated with the absence of bowel and bladder control.

Appropriate toilet usage would minimize a serious health hazard and, in many cases, render the toilet-trained retardate eligible for more formal training procedures in a classroom environment.

Very little experimental work has been conducted to determine the most efficient means of toilet training institutionalized retarded children. Ellis (1963) has presented a theoretical analysis based on molar behavior theory of how toilet training might be accomplished with such a population. The procedure employed in this study has utilized portions of the Ellis model. Dayan (1964) reports some success in applying the Ellis model by cottage attendants. Neale (1963) successfully employed reinforcement techniques to treat encopresis in a children's psychiatric ward. The work of Mowrer and Mowrer (1938) is important because it was one of the first recorded attempts to modify inappropriate elimination behavior with techniques based on learning theory. Although the Mowrers' technique commonly has been analyzed in terms of respondent conditioning, Lovibond (1963) analyzed the technique in terms of avoidance conditioning, emphasizing the role of punishment in suppressing inappropriate elimination behavior.

With the results of these studies in mind, a pilot study was conducted by the author. In this project reinforcement techniques were
applied to the elimination behavior of an institutionalized moderate retardate. Although the application of the procedure was conducted under uncontrolled conditions, appropriate toilet usage was established. This was accomplished in the normal cottage environment by cottage personnel unsophisticated in techniques of behavioral modification. (Further details of the pilot study are presented in Appendix A.)

Due to the success of this program the author hypothesized that other more severely retarded individuals might respond to a similar procedure within the usual cottage environment. An application of such techniques was systematically carried out by the author in a cottage for severe and profound retardates.
METHOD

Subjects

Selection

Subjects were selected from a cottage of severe and profound retardates. The cottage housed 56 individuals, ranging in chronological age from 6 to 22 years. The mean age was 12.8 years. IQ's ranged from 8 to 35 with most lying below 25. The 38 ambulatory residents typically spent their waking hours in the cottage day room. Very little purposeful behavior was observed. Speech and other forms of verbal behavior were absent. Those individuals who were not ambulatory or who otherwise were unable to compete physically with the day-room residents were housed in the crib room. Here, the 17 residents lacking even rudimentary self-help behaviors received infant care.

A 3-week record of the elimination behavior of the entire ambulatory population of the cottage was maintained by cottage personnel at the request of the author. This record indicated whether the bowel movement occurred (1) when S was placed on the toilet, (2) when S initiated toilet usage, or (3) when S eliminated in places other than the toilet.
The records of this 3-week period revealed that 54 percent of the bowel movements occurred in the residents clothing, while only 24 percent occurred in the toilet on the individual's initiative. The remaining 22 percent occurred when residents were taken to the toilet. The selection of subjects was made on the basis of their response patterns during the 3-week period. Five subjects with a low frequency of self-initiated toilet behavior were selected. The records of three of the subjects indicated that they had not once eliminated in the toilet during the 3-week period.

Historical Information

S1 was 8.9 years old at the beginning of this study. His mother was also retarded and had given birth to a number of other retarded children. S1 was diagnosed as having an unspecified cerebral defect. His physical maturation had been very slow, and his physical appearance was that of a 3 or 4 year old. He had a Vineland social maturity quotient of 20 and a social age equivalent of 1.68 years. During his 6 months of residence at the institution, S1 had acquired some new social skills. He began to play cooperatively with other children and to obey simple commands. Speech and self-help behaviors, however, essentially had remained unchanged. S1 had been transferred from a training cottage to a cottage for severe retardates because he lacked appropriate elimination behavior.
After the transfer S1 began to spend much of each waking day in the company of a large mongoloid boy (S3). This association was so strong that it became necessary to include both individuals as subjects in the experiment. S1 apparently had three words in his verbal repertoire—"hi," "mamma," and "daddy." The prognosis was given as "perhaps trainable at a later age," and the adjustment to the institution was considered "good."

S2 was 6.8 years old. Convulsions were noticed at 6 months and continued until S2 was 2.5 years old. While able to feed himself, S2 had no speech, did not discriminate edible substances, and initiated few play activities with other individuals. He had a Vineland social quotient of 29 and a social age equivalent of 1.65 years. S2 had been labeled hyperactive or autistic periodically during his 2-year residence at the institution. His habit of pulling strings out of dirty mops or from diapers on other residents and swallowing them frequently resulted in physical restraint. This behavior also appeared related to his continual diarrhetic bowels. The prognosis was long-term infant care.

S3 was 18.5 years old. A diagnosis of mongolism had been made in infancy. S3 lived with his family for 8 years before his institutionalization. He received an IQ of 14 and a mental age of 1.9 years on the basis of a Merrill-Palmer Intelligence Test administered 5 years previous to this study. He received a social quotient of 14 and a social
age equivalent of 2.6 years as a result of a Vineland Social Maturity Scale administered in the past year.

During the 10 years that S3 had been institutionalized there were some changes in his behavioral repertoire. S3 was reported to be toilet trained in 1956; however, this response had evolved to his only using the toilet when taken. Efforts to take him to the toilet were complicated by his weight (nearly 200 pounds) and by the resistance he offered to such efforts. Institutional records indicate that S3 was less verbal at the time of this study than he had been several years previously. He was able to dress himself partially. His general level of activity was described as very low, and he reportedly spent most of his waking hours lying on the cottage floor. The prognosis was long-term infant care.

S4 was 8.5 years old. He was born prematurely and received artificial respiration in an incubator for 2 months. At 4 months a diagnosis of hydrocephalus was made. Subsequently, S4 underwent a series of 11 operations to combat this condition. A shunt was inserted and resulted in arresting the hydrocephalic condition. In addition to the primary cranial anomaly, a gross sensory impairment was attributed to a bilateral nystagmus present in both eyes. He had a Vineland social quotient of 19 and a social age equivalent of 1.56 years. During the 3 years that S4 had been institutionalized little change in his behavioral repertoire was reported. His repertoire included ambulation, marking
with a pencil or crayon, and carrying familiar objects. He was not toilet trained, was unable to feed himself, had no speech, and did not follow any instructions. S4 was receiving 50 milligrams of thorazine three times a day to control hyperactivity and self-destructive behavior. He spent most of his waking hours in a crib since he was judged physically unable to compete with the residents in the cottage day room. The prognosis was long-term infant care.

S5 was 8.4 years old. He was the product of a normal full-term birth. There was no evidence of any precipitating etiological factors. Physical maturation was markedly slow, and a mild hypotonicity was found to be present in his legs. He had a Vineland social quotient of 25 and a social age equivalent of 1.53 years. During the 3 years that S5 had been institutionalized there was little change in his behavioral repertoire. This repertoire included ambulation, drinking from a glass with assistance, and carrying familiar objects. He was unable to feed himself, had no speech, and could not dress himself. S5 spent most of his waking hours tied in a crib since he was judged physically unable to compete with the day-room residents. The prognosis was long-term infant care.

**Design**

A baseline record of elimination behavior was kept for 4 weeks on those individuals who were selected as subjects. The baseline record
indicated the hour of the bowel movement and whether the behavior occurred: (1) when S was placed on the toilet, (2) when S self-initiated toilet usage, or (3) when S eliminated in places other than the toilet. The baseline served as a means of determining the expected time of eliminations for each individual and finally as a standard by which to judge the effectiveness of the reinforcement procedure.

During the 60-day application of the reinforcement procedures data were collected on a 7-day-a-week basis within the subjects waking hours (5:30 a.m. to 8:00 p.m.). Cumulative records of response rates during the baseline and during the reinforcement procedures were compared to determine the effectiveness of the technique employed.

Following the 60-day reinforcement period, two cottage attendants were interviewed to determine if they had noted any change in the elimination behavior of the non-experimental residents. The results of this interview offered some control in evaluating the functional relationship between the procedure that was employed and the resulting behavior of the experimental subjects. Such a comparison was desirable since practical and ethical considerations did not justify any attempt to reverse whatever appropriate behavior was generated. A reversal of the procedure would involve removing positive reinforcement contingencies following the appropriate response. This procedure would probably permit the extinction of the appropriate response and the reestablishment of the inappropriate response.
Bowel movements that occurred while the Ss were in bed were not recorded, since all but one of the subjects were tied in their beds at night as part of the regular cottage routine. The frequency of night bowel movements was very low and readily came under the control of the reinforcement procedure. This topic is discussed further in the section on generalization.

Since bladder incontinence and bowel incontinence are independent behaviors, it was felt that an attempt to modify both responses simultaneously would complicate the procedure. Later, after some consistency of bowel control had been established, urinating in the toilet was reinforced.

**Facilities**

The cottage in which this study was conducted contained a day room with an adjoining bathroom, a dormitory, a dining area, and a crib room adjoined by a second bathroom and a crawl room. The bathrooms contained four stools, a shower, a tub bathing area, and a receptacle for cleaning diapers.

Both bathrooms were in constant use, as diapers continually were changed and showers frequently administered. The crib room with the adjoining bathroom and crawl room were selected as the area open to the experimental subjects since this unit contained the fewest
residents. Two of the five ambulatory residents housed in this area were selected as experimental subjects.

The dining area contained cupboard space where food supplies could be stored as well as a refrigerator where perishable food items could be kept. A floor plan of the cottage is presented in Figure 1.

General Procedures

Positive Reinforcement

Initially, all appropriate toilet behavior was reinforced with sweet foods, such as candy and ice cream. It became necessary, however, to tailor specific reinforcers for each subject in order to modify their behavior. For example, with two subjects who refused candy after appropriate behavior, baby food was used as a positive reinforcer.

Positive reinforcers ranged from food, a ride in a wheel chair, a shower, a ball, allowing the subject to return to his bed following appropriate responses, etc. Stimuli that were used to reinforce the behavior of one subject often had no apparent control over the behavior of another subject. For example, a shower was employed to reinforce appropriate behavior with one subject, while a shower was used as an aversive contingency for another subject.

Social stimuli such as a hug and the words "good boy" immediately followed toilet elimination. The social stimuli became conditioned
A floor plan of the cottage in which the program was administered.
reinforcers by being administered immediately after the appropriate responses and preceding the distribution of the unconditioned reinforcer.

At times, it became necessary to administer unconditioned reinforcers without their being made contingent upon elimination behavior. Food, for example, was given at the end of a day in which no appropriate response occurred. Whenever it became necessary to administer a reinforcer without its being contingent upon elimination behavior, care was taken to allow at least a 10-minute interval to elapse from the time of the last inappropriate response. This procedure was necessary to prevent the strengthening of inappropriate behavior.

The schedule of reinforcement was thinned as the subjects consistently emitted the appropriate response. Continuous reinforcement was reemployed whenever environmental conditions were modified in order to generalize the behavior. Introducing a subject to the day room after several weeks in the crib room is an example of a modified environmental condition.

After unconditioned reinforcers (food) were reduced, the elimination behavior was maintained by intermittent social reinforcers.

Positive reinforcers frequently were employed in conjunction with negative reinforcement and aversive contingencies. Positive and negative reinforcement were used to strengthen the toilet elimination response while aversive contingencies were used to suppress soiling.
The use of positive reinforcers will be discussed further in those sections dealing with shaping and generalization.

Negative Reinforcement

The subjects sometimes escaped aversive stimuli by eliminating in the toilet. For example, a subject could escape physical restraint and obtain meals at his regular hours by emitting the appropriate elimination response.

Negative reinforcement generally was used only after aversive contingencies previously had been employed. Often subjects were restrained physically following inappropriate responses and released from the restrainer following appropriate responses. After the aversive contingency was administered for a fixed interval, negative reinforcement rarely was employed. The interval of the aversive contingency was of such short duration that an appropriate response rarely occurred before the aversive stimuli were removed. Negative reinforcement was not continuous and as a result probably did not contribute as much as positive reinforcement and aversive contingencies in shaping the appropriate response.

Aversive Contingencies

Aversive stimuli were made contingent upon inappropriate responses in order to hasten the conditioning process. Mildly aversive
stimuli were employed to suppress soiling, while positive reinforcers were employed to increase the incompatible toilet elimination response. The aversive stimuli utilized included ignoring the subject, terminating meals, attaching the subjects to the end of a 10-foot rope, retaining the subjects in the crawl room, allowing the subjects to remain in soiled clothing, and placing the subjects in restraining jackets. These stimuli were modified for use with each individual.

Aversive contingencies were not originally intended to be an important aspect of the procedure but were in fact used, although only after positive reinforcement alone had been found to be ineffective in modifying the behavior. When an aversive contingency was employed to suppress soiling, the contingency was faded rapidly when $S$ began to respond consistently with appropriate behavior. Positive reinforcers, such as praise, were then used to maintain the response.

Extinction

Two of the subjects often were observed consuming and playing with their feces. For these subjects, the feces appeared to be a positive reinforcer, which maintained soiling behavior. In order to extinguish whatever degree of soiling was maintained by access to feces, the feces were removed from these subjects immediately after soiling responses.
Shaping

Each subject received his first six meals while sitting on the toilet regardless of the elimination response. This is an example of the use of positive reinforcement to shape intervals of the appropriate sitting response. After intervals of sitting on the toilet were established, reinforcement was made contingent upon bowel elimination. Suppositories and milk of magnesia were employed to increase the response rate and to facilitate the association between the reinforcer and the response.

Shaping procedures also were used to obtain the appropriate removal of undershorts. Frequently, the subjects failed to remove their undershorts while eliminating on the toilet, or they removed them completely from their legs. After approximations of the appropriate behavior had been reinforced, the subjects came to remove their pants to a position just below their knees when sitting on the toilet.

Self-initiated toilet usage was also established after shaping procedures were employed. The subjects were attached to ropes, which permitted access to the toilet but prevented them from leaving the bathroom area. Responses that brought the subjects closer to the toilet were reinforced. Eventually, the subjects walked from any place in the bathroom and stood in front of the toilet. They were then coerced to sit on the toilet before the reinforcer was presented. As soon as the
subjects consistently initiated toilet sitting while attached to the rope, the rope was faded, and the reinforcer was made contingent on a bowel response.

Shaping procedures were used with one subject to increase his general activity level as well as to obtain self-initiated toilet usage. This was accomplished by reinforcing the subject for playing catch with a ball, then for retrieving the ball, and finally for sitting on the toilet after retrieving the ball. A detailed description of this procedure can be found by referring to Week 1 in Appendix D.

One subject was taught to feed himself by way of shaping. This procedure involved reinforcement of successive approximations of appropriate spoon usage. It was necessary to tip the food bowl to facilitate spoon usage and then to fade it back to its usual position. A more detailed description of this process is found in Week 6 of Appendix E.

Generalization

Appropriate elimination behavior readily was obtained under several differing stimulus conditions. For example, two subjects were returned to the cottage day room after receiving reinforcement contingent upon toilet usage in the crib room. Much less time was necessary to obtain consistent toilet usage with continuous reinforcement in the new environment than initially was necessary in the crib room.
Elimination behavior at night (8:00 p.m. to 5:30 a.m.) also came under the control of reinforcers even though E was not present at this time. One subject frequently eliminated in the toilet during the night hours. The rate of night soiling dropped to zero even for those subjects who regularly were tied in their beds at night.

Response generalization was evidenced by the ease with which urination came under the control of reinforcement. Reinforcement was not made contingent upon urination until the subjects consistently emitted the appropriate bowel response. While subjects occasionally urinated in the toilet before specific training was begun, urinating in the toilet was generated rapidly and maintained when the response was positively reinforced.

Organismic Conditions

Physiological variables also necessitated a modification of the procedure in the case of each subject. All but one of the subjects were ill at least once during the 8 weeks in which the procedure was applied. Occasionally, the behavioral manifestations of the illness, such as diarrhetic bowels, markedly influenced the elimination response rate. At times the treatment of illness was incompatible with self-initiated toilet elimination. For example, one subject was bound to his bed for almost an entire day to prevent complications of his illness. Another subject was given several enemas to combat gastric inflammation.
Weight loss was considered in determining the amount of the food reinforcer to be administered to the subjects. If a subject had lost more than 2 pounds in a week he was fed larger portions of food. Food deprivation initially was maintained by lengthening the interval between feeding. Subjects frequently were fed only one large meal at the end of a day in which no appropriate response had occurred. When the rate of toilet elimination increased, subjects received smaller portions of food at more frequent intervals.

**Setting Events**

Many uncontrolled variables were introduced as a result of this project being conducted in the normal cottage environment. Dirty diapers were being cleaned constantly in a receptacle that was located near the toilets. Attendants unintentionally, but not infrequently, sprayed water on the subjects while they were sitting on the toilet. Subjects who were in the midst of an aversive contingency following an inappropriate response frequently were treated with affection by attendants who were well meaning but unappreciative of the technique being utilized.

The strength of the positive reinforcers occasionally was reduced as a result of the behavior of the cottage work boys. Reinforcers such as candy or a ball were taken intermittently from the subjects by
the work boys, who were residents of higher grade cottages in the institution.

There were also instances in which subjects were locked in the crawl room with the other cottage residents. This prevented the subjects from having access to the bathroom.

Interaction between the cottage personnel, other institutional employees, other residents, and the subjects could not be systematically controlled due to the normal cottage activities.

These conditions are not presented to emphasize obstacles in applying the procedure but rather are offered as evidence that inappropriate behavior can be modified even under adverse conditions.
SPECIFIC PROCEDURES AND RESULTS

Since the application of the procedure varied between Ss, a description of the procedures and results for each S is required. A more detailed chronology of the procedure and its effect on each S is presented in the appendices.

S1

S1 was 8.9 years old at the time of this study. After coming to the cottage for severe retardates, he began to spend much of each waking day in the company of S3. S1 had been institutionalized for about 1 year.

The baseline records indicate that 67 bowel movements occurred in this 4-week period. All the bowel movements were in some place other than the toilet (see Fig. 2). Twenty-eight percent of the 67 bowel movements occurred between 6:00 a.m. and 7:00 a.m., with little regularity in the remaining bowel movements. Initially, positive reinforcers were used to shape sitting on the toilet. These reinforcers included baby food, ice cream, jello, and social stimuli. It was necessary to tie S1 in the toilet-training chair while the reinforcers were being administered because he refused to sit on the toilet for more than
FIGURE 2

A cumulative record of bowel responses for S1.
an instant. The toilet-training chair quickly was faded and was not used with S1 after the third day.

Tantrums and crying occurred throughout the first 3 days. When it became apparent that this behavior could not be extinguished easily, S3 was introduced to observe the effect of his presence upon S1's behavior. The tantrums and crying subsided. S1 also responded to S3's presence by initiating toilet sitting whenever S3 was seated on one of the other toilets.

Suppositories and milk of magnesia were administered to S1 in order to control the response rate and to facilitate the association between the appropriate response and the reinforcer. Their use was discontinued when S1 consistently eliminated in the toilet on his own initiative.

The distribution of meals was made contingent upon appropriate bowel elimination. S1 was responsive especially to social stimuli, such as a smile or a hug. Aversive contingencies consisted of attaching S1 to the end of a rope or placing him in the crawl room. He was released from the rope when he emitted appropriate elimination behavior.

It was not necessary to shape self-initiated toilet usage by the method of successive approximations. While S1 frequently sat on the toilet when S3 used the toilet, he soon initiated toilet sitting at times when S3 was not in the bathroom. Due to the high frequency of this
sitting behavior, reinforcement was given only when SI emitted an appropriate bowel response while sitting on the toilet. The response of sitting without emitting the appropriate response was extinguished.

Appropriate bowel elimination was self-initiated consistently by the end of the third week of the procedure (see Fig. 2, point a). Urination also was brought under the control of reinforcers during the third week.

Undershorts were placed on SI after appropriate urination behavior was established. His undershorts had been removed the first week to facilitate the utilization of dry clothing as a conditioned reinforcer. Shaping procedures were used to teach SI to remove his pants to a position just below his knees while sitting on the toilet. This behavior was established after a 1 hour training session.

E began to attach SI to a rope in the morning following night soilings during the fifth week of the procedure. After the frequency of night soilings dropped to zero, SI was clothed in pajamas rather than diapers during the night hours.

The schedule of unconditioned reinforcement was thinned during the fourth week, and ultimately the use of food reinforcers was discontinued. SI consistently responded with the appropriate elimination response throughout the final 3 weeks of the project (see Fig. 2).
S2

S2 was 6.8 years old. He was able to feed himself but had no language and did not discriminate edible substances. His habit of pulling strings out of dirty mops or from diapers and swallowing them resulted in continual diarrhetic bowels. S2 frequently was placed in a restraining jacket to prevent this behavior.

The baseline records indicate that 43 bowel movements occurred in the 4-week period. Ten percent of this total occurred between 7:30 a.m. and 8:30 a.m., with very little regularity in the remaining movements. Eleven percent of the 43 bowel movements occurred when S2 was taken to the toilet. No self-initiation of toilet usage was reported (see Fig. 3).

Initially, sitting on the toilet for 10-minute periods was reinforced by feeding S2 while he sat on the toilet regardless of the elimination response. This procedure was continued for six meals. The meal was terminated if S2 left the toilet prematurely. S2 began to sit on the toilet without being fed for 10-minute intervals.

Reinforcers were then made contingent upon bowel elimination while S2 was on the toilet. Suppositories were used on several occasions to elicit a response which was reinforced immediately. Appropriate elimination behavior was reinforced with candy, meals, juice, and ice cream. Showering was later discovered to be a reinforcer. Thereafter,
A cumulative record of bowel responses for S2.
showers were made contingent upon appropriate elimination behavior. 

S2 was cleaned with a damp cloth following inappropriate responses. 

Placing S2 in the crawl room was used as an aversive contingency. However, since S2 could climb out of the crawl room, even though the door was locked, this procedure proved ineffective. Thereafter, he was attached to a short rope in the crawl pen following inappropriate behavior. This too proved ineffective, since he was able to unfasten the rope. Finally, S2 was placed in a restraining jacket and attached to a short rope in the crawl pen following inappropriate behavior. The aversive condition was terminated when S2 next was taken to the toilet.

It was not feasible to allow S2 to wear his frequently soiled clothing for any length of time, since he was observed to consume feces from soiled clothing. Removing undershorts from him entirely also had socially aversive consequences. An increase in masturbation followed whenever his undershorts were removed for long intervals. Due to the high rate of S2's elimination responses, he was attached to a rope in the crib bathroom rather than in the crawl room to permit access to the toilet. Since S2 was retained much of each day in the bathroom, an opportunity to shape self-initiation of elimination behavior was available. Responses that brought him closer to the toilet were reinforced with small pieces of candy. S2 was sitting on the toilet on his own initiative at the end of an hour training session. The schedule was then
thinned, and ultimately it became necessary for S2 to respond with a bowel movement to receive the reinforcer. The rope was then faded, and S2 began initiating bowel movements from the crib room (see Fig. 3, point a). Toilet usage was emitted consistently for the duration of the project.

Reinforcement was also made contingent upon appropriate urination while S2 was attached to the rope. He responded quickly, and by the end of the fifth week S2 was urinating consistently in the toilet. S2 initiated the practice of removing his shorts and leaving them on the floor following toilet usage. This behavior was eliminated by retaining S2 in the bathroom until his pants were put back on.

S2 was returned to the cottage day room during the seventh week. He was attached to a rope in the bathroom for 1 day. Generalization was indicated by S2's consistent, self-initiated toilet usage the first day in the new environment (see Fig. 3, point b). He was returned to a continuous reinforcement contingency administered by the cottage attendants in order to strengthen the response under the new stimulus conditions.

On several occasions inappropriate behavior was reinforced by attendants who administered showers when S2 soiled his clothing. Appropriate toilet usage frequently was ignored. At this point, the inappropriate response rate increased. The importance of maintaining the prescribed contingencies was explained to the attendants. Positive
reinforcement once again was made contingent upon appropriate elimination behavior. Hereafter, the rate of inappropriate elimination behavior returned to zero (see Fig. 3, point c). The schedule of reinforcement was thinned again, and social reinforcers alone were used to maintain the response rate.

S3

S3 was an 18.5-year old mongoloid. He had been institutionalized for 10 years. Previous efforts to take him to the toilet had been complicated by his weight (nearly 200 pounds) and by the resistance he offered to such efforts. His general activity level was very low, and he reportedly spent most of his waking hours lying on the day-room floor.

The baseline records indicate that 30 bowel movements occurred during the 4-week interval. There was little regularity in the response pattern. Ten percent of the 30 bowel movements occurred in places other than the toilet, while 90 percent occurred when S3 was taken to the toilet (see Fig. 4).

S3 became a subject on the third day of the project for reasons discussed in the summary of S1.

Shaping procedures were used to increase S3's general activity level and to establish appropriate toilet usage. A ball appeared to be a reinforcer, since S3 continually carried one with him. Initially, handing
A cumulative record of bowel responses for S3.
BASELINE

REINFORCEMENT PROCEDURE

TOILET, SELF INITIATED

TOILET, OTHER INITIATED

SOILED

DAYS

10 50 90
the ball to E was reinforced with pieces of graham cracker and by giving S3 back the ball each time he gave it to E. Soon S3 was rolling the ball back and forth with E without the food contingency. E then began throwing the ball farther and farther away from S3. He was once again reinforced with small amounts of food for retrieving the ball. After he would retrieve the ball from any place it was thrown, E began to throw it in the vicinity of the toilet and accompanied S3 when he retrieved the ball. S3 was placed on the toilet after the ball was retrieved and rewarded following the behavior. After S3 began to sit on the toilet consistently, the ball was faded, and the reinforcement was made contingent upon an elimination.

Further evidence of generalization under a change in stimulus conditions was the consistency with which the appropriate response was emitted after S3 was returned to the day room (see Fig. 4, point a). His general activity level, however, seemed to extinguish after he was returned to the day room. In this environment his hiding, wrestling, and ball playing were not reinforced by busy attendants nor by the other residents.

While meals remained contingent upon toilet usage throughout much of the 8-week interval, S3 quickly learned to use the toilet just before meals were served. It rarely was necessary to withhold his food.
S4 was a 5.5-year-old arrested hydrocephalic. He had been institutionalized for 3 years. He was unable to feed himself, had no verbal repertoire, and did not follow simple instructions. His vision was grossly impaired. S4 was a permanent resident of the crib room.

The baseline records indicate that 47 bowel movements occurred in the 4-week interval. Not a single bowel movement occurred while S4 was on the toilet (see Fig. 5). Thirty-two percent of the bowel movements during the baseline period occurred in the interval between 7:30 a.m. and 8:30 a.m. There was little regularity in the remaining movements.

The first six meals were served while S4 was seated on the toilet in order to reinforce toilet sitting regardless of the elimination response.

After S4 began to sit for long intervals on the toilet, reinforcement was made contingent upon appropriate elimination behavior. Initially, suppositories were used to elicit the response while S4 was seated on the toilet. Ice cream, candy, baby food, and juices were used as reinforcers.

On several occasions, E discovered S4 smearing feces on the crawl-room floor. The possibility was considered that toilet usage might become aversive to this individual, since he would have to
FIGURE 5

A cumulative record of bowel responses for S4.
discontinue an incompatible behavior that apparently had considerable strength. Finger paints and crayons were introduced in an effort to substitute them for the less appropriate painting material. This too proved undesirable because it was more difficult to clean the room after had smeared the paints than it was when feces were smeared. frequently used saliva and urine in this "painting" behavior. ignored "painting" with saliva or urine but responded to feces smearing by cleaning and removing the bowel movement from the floor. Hereafter, the smearing of bowel movement subsided.

By the end of the third week, bowel movements consistently were produced in the interval between 7:00 a.m. and 7:30 a.m. The morning and noon meals were made contingent upon having at least one bowel movement in the toilet each day. If no bowel movement occurred before the breakfast meal, this meal was missed. The same contingency held for the noon meal.

Other aversive contingencies included attaching to a rope in the crib bathroom following inappropriate responses. He was released following the next appropriate response. If another inappropriate response occurred before had been released from the rope he was placed in a restraining jacket. The jacket rarely was required, since was released from the rope after an hour interval regardless of his elimination behavior.
Self-initiation of toilet elimination was shaped while S4 was attached to the rope. S4 responded to this procedure after several training sessions. (Further details of this procedure are found in Week 7 of Appendix E.) Although he continued to be placed on the toilet as soon as he was awakened each morning, S4 consistently eliminated in the toilet at all other times on his own initiative.

Shaping procedures were also employed to establish appropriate feeding behavior. Each time S4 removed the spoon from his mouth and brought it a little closer to the food bowl the spoon was refilled for him. Eventually, S4 began to direct the spoon toward the bowl regardless of its position. The bowl was then tipped so that the soft food content would fill the spoon whenever the spoon was delivered to the bowl. The bowl then was returned gradually to its normal position. S4 was feeding himself without E's assistance eight meals after the commencement of this procedure (see Week 6 in Appendix E).

Generalization of the toilet response was evidenced by the speed with which urination came under the control of reinforcers. After reinforcement was made contingent upon appropriate urination behavior, S4 was not clothed in undershorts for several days. This prevented wet shorts from being a source of urine for painting. Urine that was deposited on the floor was mopped dry immediately. He continued to "paint" with saliva, however, after urine was made inaccessible.
By the end of the eighth week, S4 consistently was using the toilet for all elimination behavior. While bowel movements continued to occur most frequently when S4 was placed on the toilet each morning, he consistently self-initiated all other elimination appropriately (see Fig. 5, point a).

S5

S5 was 8.4 years old. He was unable to feed himself, had no verbal repertoire, and could not dress himself. He had been institutionalized for 3 years and was a permanent resident of the crib room.

The baseline records indicate that 36 bowel movements occurred in the 4-week interval. Not a single bowel movement occurred while S5 was on the toilet. There was no regularity evident in the frequency of bowel movements (see Fig. 6).

The first six meals were fed while S5 was seated on the toilet to reinforce sitting on the toilet. It was necessary to tie S5 in the training chair to maintain his sitting behavior since he refused most of his meals the first week.

Even though appropriate behavior was not established in the initial stages of the procedure, food was made contingent upon elimination responses while S5 was tied in the training chair. Suppositories frequently were administered, although S5 usually refused the reward. The appropriate response was maintained for a 4-week period by
A cumulative record of bowel responses for S5.
suppositories; however, after their use was discontinued, soiling returned to its former level (see Fig. 6, point a).

A positive reinforcer could not be found. Candy, ice cream, and juices were refused. S5 cried when given a shower. Various objects, such as dolls, balls, and other toys, were given to S5 in an attempt to locate a strong positive reinforcer. A box of toys from S5's home was brought to the cottage, but S5 did not respond to any of the objects.

E proposed to tie S5 in the toilet-training chair until an elimination response occurred. The event of his being untied then could be used as a negative reinforcement. S5 spent 36 hours on the toilet over a 3-day period without an elimination response. A suppository was given after the thirty-sixth hour, and this procedure was discontinued. S5 had begun sitting on the training chair without the necessity of his being tied during this period.

Since positive reinforcers had not been effective, further aversive contingencies were used. Allowing S5 to remain in soiled clothing did not prove effective, since he was observed smearing or consuming feces on several occasions. S5 was then attached to a rope following inappropriate responses, which allowed him to reach the training chair but not to leave the bathroom. He then began to play in the toilet by putting his hands under the water in the toilet bowl. S5 was placed in a restraining jacket, in addition to being attached to the rope.
following inappropriate responses, in order to strengthen the aversive contingency. S5 responded to this condition by placing one of his feet in the toilet bowl. Showers were also made contingent upon inappropriate behavior. This procedure seemed to have no effect on his response rate (see Fig. 6, point b).

A blindfold was placed on S5 after an inappropriate response during the seventh week. This stimulus proved to be aversive, and S5 cried loudly with it on. Hereafter, a simple Halloween mask with the eyes taped closed was placed on S5 along with the restraining jacket immediately following inappropriate responses. The mask was allowed to remain on S5 for 5 minutes, after which he was showered and attached to the rope for an hour interval. Shortly after this procedure was employed, S5 began to run and sit on the toilet (not the training chair) as soon as the mask was removed and the shower was completed. Thereafter, S5 began initiating appropriate toilet usage for which he was reinforced with a ride in a wheel chair (see Fig. 6, point c). The strength of this reinforcer became evident when S5 began to sit in the wheel chair when not using the toilet. Appropriate urination behavior was also brought under the control by aversive contingencies during the eighth week. By the end of the eighth week, S5 was consistently emitting appropriate elimination behavior (see Fig. 6).
**Other Residents**

An interview was conducted with two attendants familiar with the behaviors of the cottage residents at the end of the eighth week. The attendants were asked to appraise the elimination behavior of the cottage residents. This interview revealed that the attendants had observed no increase in appropriate elimination behavior with any residents excepting the subjects of this study. This was a rather gross control, since records were not kept on the elimination responses of the other residents during the 8-week interval. However, spontaneous initiation of toilet usage by incontinent residents had never been observed by attendants, and since the residents not included as subjects in this study were treated no differently than usual, there was no apparent reason to question the reliability of the attendant reports.
DISCUSSION

This study demonstrated that toilet elimination could be established in severely retarded subjects by the application of operant techniques. It was not intended that this work be utilized to isolate critical variables in controlling elimination behavior. Further research in which independent variables are studied in isolation is a necessity before such conclusions can be made. A reversal of the procedure and intra-subject replication would be necessary to demonstrate experimentally that the procedure was responsible for producing the changed behavior. The application of reinforcement procedures to clinical problems, however, itself can be a worthwhile demonstration when a reversal of the procedure and intra-subject replication are neither practical nor ethical. Other studies have demonstrated the functional efficacy of reinforcement procedures in clinical applications (Ayllon and Michael, 1959; Allen et al., 1964; Harris et al., 1964; Hart et al., 1964; Wolf et al., 1964; and Sherman, in press). Their findings experimentally support the general use of reinforcement procedures in modifying inappropriate human behavior.

The most important result of this study then was that an increase in appropriate elimination behavior was obtained with all five
The value of this application may best be accessed following a discussion of the problem.

The lack of toilet elimination presents many complications when large numbers of incontinent individuals are housed together. The accumulation of soil and urine on the unit floor poses a serious health hazard. Proper toilet usage would reduce the spread of parasites carried in human waste. Appropriate elimination behavior would also reduce the amount of time attendants spend in changing soiled clothing. Attendants would then be free to work with the retardates in developing other appropriate behaviors. In many cases the children made continent would be eligible for more formal training procedures in higher level units and in school programs.

This study has further value in demonstrating that reinforcing stimuli commonly available in an institutional environment can be used to modify behavior when the distribution of the stimuli is made contingent upon behavior. Social stimuli, candy "treats," special privileges, etc. are commonly administered to institutional retardates but are rarely distributed in close temporal sequence to desirable behavior. Aversive conditions—such as physical restraint—while prevalent, are rarely used effectively as aversive contingencies. It is not uncommon for individuals to be kept in restraining jackets for weeks at a time due to a history of inappropriate behavior, such as tearing clothing. This study demonstrates that aversive stimuli, such as restraining jackets, can be
used effectively to modify inappropriate behavior when distributed for short intervals contingent upon that behavior. A further distinction should be made. In this study restraining jackets, etc., were not used to physically restrict behavior but rather to suppress its occurrence under free operant conditions while more appropriate responses were being reinforced.

There were numerous difficulties associated with conducting operant conditioning procedures in a normally functioning cottage environment. The lack of control of variables, such as the behavior of both cottage personnel and other residents, forced E to sacrifice much of his freedom to manipulate the independent variables systematically. However, the important consideration is not that research was difficult in the normal cottage environment but rather the results that were obtained while these conditions were present. The value of a project conducted in the normal cottage environment is appreciated when one considers the potential utility of such procedures in training larger populations within similar environments.

The greatest value of this study may lie in its demonstration that appropriate self-care behavior can be shaped and maintained in human organisms with very limited behavioral repertoires. Any change in the behavior of these subjects is significant, for so often further training procedures are not attempted with individuals who have failed to develop self-care behaviors as a result of the usual training procedures.
When self-care abilities fail to emerge in the behavioral repertoire by mid-childhood, the individuals lacking these abilities may be judged severely retarded, grossly brain damaged, or inaccessibly autistic and a belief fostered that nothing but custodial care is appropriate for them. Individuals with social quotients below 30 generally do not respond to traditional training practices because the usual complex reinforcers referred to as social approval, status, peer acceptance, etc. have little affect on their behavior. Human organisms generally will respond to reinforcers such as food, drink, tactile stimulation, physical restraint, etc. even when the more sophisticated reinforcers are ineffective. This study is offered as evidence that appropriate self-care behaviors can be obtained from individuals judged severely retarded when the available reinforcers are distributed contingent upon the desired response and that this can be accomplished under the normal institutional conditions.
SUMMARY

The purpose of this study was to demonstrate that reinforcement procedures could be used to train severely retarded individuals. A secondary goal was to accomplish appropriate toilet usage with institutionalized retardates in their usual cottage environment.

Five individuals with a low frequency of appropriate toilet usage were selected as subjects. The procedures used to modify inappropriate elimination behavior included positive reinforcement, negative reinforcement, aversive contingencies, extinction, shaping, and generalization. These procedures were modified for use with each subject.

S1 responded best to a combination of food reinforcers, social reinforcers, and mildly aversive contingencies. Shaping procedures were used to strengthen the response of sitting on the toilet. Shaping was also employed to obtain the appropriate removal of undershorts. Generalization was evidenced by the ease with which urination came under the control of reinforcers.

For S2 toilet usage was accomplished with a number of positive and aversive contingencies. Shaping was employed to increase the length of time for which S2 sat on the toilet. Generalization was evidenced by
the ease with which urination came under the control of the reinforcement procedure as well as by the consistency with which toilet usage was emitted under the stimulus conditions of the cottage day room.

S3 most consistently responded to food and social reinforcers. Shaping was employed to increase his general activity level as well as to establish self-initiated toilet usage. Initially, reinforcers were made contingent on both appropriate bowel and urine elimination behavior, since S3 previously had a high rate of elimination when placed on the toilet. S3 responded with appropriate toilet usage after he was returned to the day room.

S4 responded consistently to the equal use of positive and negative contingencies. Shaping procedures were employed to establish appropriate sitting behavior, self-feeding, and self-initiated toilet usage. Consistent toilet urination was obtained by the termination of the project.

S5 did not respond to the positive contingencies that were employed with the other Ss. Aversive contingencies were used primarily until the appropriate response was established. Self-initiated toilet usage was not emitted consistently until the final week of the project.

The results of this study offer further evidence that operant conditioning techniques may be an effective means of establishing self-care behaviors in institutionalized retardates.
APPENDIX A
A PILOT STUDY

Operant conditioning techniques were applied to modify the inappropriate elimination behavior of a moderate retardate in a pilot study.

The Problem

Inappropriate elimination behavior became of interest to the author when he was consulted by a cottage guardian about this problem. The guardian reported that a male adolescent in his charge was incontinent and that he was scheduled to be moved to a cottage for more severely retarded individuals unless appropriate elimination behavior was established. The boy, V. P., reportedly refused to use the toilet facilities available in the cottage, even though his history indicated that he had been toilet trained while living at home. V. P. was not considered eligible for educational placement due to his inappropriate elimination behavior.

Historical Data

On the basis of his performance on the Stanford-Binet Intelligence Test Form L-M, an IQ of 50 was attributed to V. P. He has
been diagnosed as Laurence-Moon-Biedl syndrome and housed in a cottage for moderate retardates.

His behavioral repertoire included cooperative play activities, speech, and the ability to read at an elementary level. His motor behavior was uncoordinated, and he had to be aided in rising from a sitting position. Inappropriate elimination behavior most frequently occurred following his arousal from sleep and after the noon and evening meals.

**Procedure**

The guardian was advised to 'coerce V. P. to sit on the toilet for periods of half an hour during the intervals of expected bowel movements. The boy was to be taken to the toilet at any other time upon his request. Since V. P. was on a low-calorie diet to control his very obese condition, small quantities of desirable food and liquid were employed as reinforcers. Fruit juices and M & M candies were used most frequently. Social reinforcers, such as praise, also were presented following appropriate behavior.

Initially, V. P. was given a candy or juice reinforcer immediately following his departure from the toilet regardless of whether or not he had eliminated. Soon he began requesting to be taken to the toilet. The reinforcer was then made contingent upon elimination in the toilet. When the boy began to use the toilet appropriately, the guardian was advised to thin the schedule of reinforcement to a-one-a-day basis,
later to a three times a week, and so on until all reinforcers other than praise were terminated. V. P. expressed a desire to attend school classes at the institution. He was told that if he would not soil his clothing in the period preceding the fall commencement of classes (a 2-month period) he would be enrolled in the school program.

Results

No soiling occurred after the first toilet elimination was reinforced. When the 2-month period elapsed without a single "accident" the promise was kept, and V. P. was enrolled in the institution's school program. A check some months later revealed that the boy continued appropriate toilet usage and was able to deal more effectively with his environment as a result of further training efforts in the school classroom.
APPENDIX B
CHRONOLOGY OF S1

This appendix presents a weekly summary of the procedure and results as they occurred in the modification of the elimination behavior of S1. The baseline interval is not included in this summary.

Week 1 On the first day of this week, S1 was taken from the cottage day room and placed with the other subjects in the crawl room adjoining the crib room. S1 was placed on the toilet at 6:30 a.m. the first day, about 15 minutes after a minimal breakfast. He cried loudly and would not remain seated on the toilet. He was then tied on a toilet-training chair for a half hour period. This interval produced rather violent crying but no bowel response. S1 was placed again on the toilet at 11:15 a.m., and again S1 cried violently; but amid such apparent displeasure, a bowel movement was produced. This response was followed immediately by ice cream, baby food, a hug, and the words "good boy." Tantrums and crying occurred throughout the day whether S1 was in the crawl room or on the toilet. There was no bowel movement, but only more crying when S1 was tied on the training chair for a half hour at 2:30 p.m. E chose to make meals contingent upon S1 merely sitting upon the toilet in an effort to sustain intervals of sitting
without the necessity of tying S1. The dinner meal was given while S1 was on the toilet, even though no bowel response occurred. The next three meals were given to reinforce sitting on the toilet regardless of S1's bowel response. The second day S1 continued to lie on the floor and cry frequently. A suppository was used to induce a bowel response, which was rewarded by ice cream. Since the crying continued on the third day, it was decided to introduce S3 and observe what effect his presence would have upon S1's behavior. S3 had been considered a candidate for the experimental procedure, and baseline data had been accumulated; however, he was not selected as a subject the first day because he consistently had bowel movements when placed on the toilet, although no self-initiated behavior had been observed. The plan was to introduce S3 into the study at the time the other Ss were at the comparable response level. S1 responded to S3's presence by initiating trips to the toilet when S3 went. Therefore, it was decided to include S3 in the experimental group at this time. The first self-initiated bowel movement occurred on the sixth day.

Week 2 Ss were no longer kept long hours in the crawl room, since this room frequently was locked and did not permit access to the bathroom. It was discovered that S1 did not eat candy, and therefore reinforcers were limited to ice cream, jello, and baby food in addition to the social reinforcers. Suppositories were used on three occasions to elicit a bowel movement. Bowel movements in the toilet were
reinforced continuously. When bowel movements occurred in places other than the toilet, S1 was placed in the crawl room for about an hour. This was felt to be an effective aversive contingency, since S1 was separated from S3 during this interval. Since when he wore shorts they were continually wet, S1 was clad only in a T shirt. It was necessary to remove the shorts until urine elimination could also be brought under control for dry clothing to become a conditioned reinforcer. Bowel movements up to this point had been very irregular, even though the diet remained rather constant; therefore, it was decided to place all food contingent upon bowel elimination in order to strengthen the association of the response and the reinforcer. Regardless of whether bowel movements occurred in the toilet, S1 was fed a large meal each day prior to his being put to bed in the evening. This meal was given at least 10 minutes after the last unsuccessful elimination attempt on the toilet in order not to reinforce unsuccessful behavior.

Week 3 S1 began to initiate frequent trips to the toilet without S3 also sitting on the toilet. Suppositories were given twice, and the bowel response was reinforced immediately on both occasions. Milk of magnesia was administered on the sixth day of the week in order to increase the frequency of the response. On this day S1 had three self-initiated bowel movements, and all were reinforced by food and praise. Urinating in the toilet was then put on a continuous schedule of reinforcement. Urination came under the control of the reinforcer the
first day this contingency was put into effect. This was evidenced by the frequent number of trips to the toilet, which resulted in urine being eliminated (22 trips). SI consistently was initiating elimination behavior in the toilet by the end of this third week of the experimental procedure.

Week 4 The food reinforcement following urination was thinned to a several times a day basis, and by the end of this week urination was being maintained predominantly by social reinforcers. Meals remained contingent upon bowel movements.

Week 5 Since bowel movements occurred during two successive nights, SI was attached to a rope, about 10 feet in length, in the bathroom the morning after the second bowel movement had occurred. This rope permitted him to sit on the toilet while its length did not allow him to leave the bathroom area. SI was fed and unattached following the next bowel movement in the toilet. Hereafter, any accidents resulted in his being attached to the rope. Training was undertaken to teach SI to remove his undershorts when sitting on the stool. Shaping techniques were used, and after approximations of the appropriate behavior had been reinforced, SI came to remove his pants to a position just below his knees when sitting on the toilet. Meals were fed at the regular hour provided that SI was not attached on the rope. The reinforcers were minimized to very small portions of food once each day. Since all children in this cottage received enemas following 2 days elapse without
a bowel movement, SI was given an enema and placed on the toilet on one such instance.

**Week 6** SI failed to remove his undershorts while eliminating on the stool and as a result was forced to wear the soiled shorts for about 10 minutes while attached to the rope. After 10 minutes, SI was showered and attached to the rope again until the next bowel movement occurred. This situation occurred the following day with similar consequences. SI was ill on the third day. The following day his temperature was normal, but his bowels were loose, and his pants were soiled on two occasions. An enema was given to relieve a gastric condition on the fifth day of the week. Attachment to the rope followed all inappropriate eliminations. The food reinforcers used to maintain the bowel elimination response were thinned to an every other day basis.

**Week 7** SI was returned to the cottage day room without any noticeable effect on SI's behavior. The food reinforcement was discontinued, and SI's responses were maintained solely by social reinforcers. One soiling occurred when SI was locked in the crawl room by an attendant while E was at lunch. Attachment to the rope followed all inappropriate bowel or urine elimination behavior. Since nearly 2 weeks had passed without a single night soiling, SI was put to bed clad in shorts rather than his usual diapers. The cottage personnel also were advised not to tie SI in his bed (which was the regular cottage procedure) for the duration of the study in order to permit toilet usage during the night.
S1's undershorts were soiled two nights, and on the following mornings he was shown the dirty pants, attached to the rope, and scolded with the words "bad boy." On no other occasion for the duration of this procedure was S1's undershorts soiled during the night hours.

Week 8 S1 continued to eliminate on the toilet with high consistency; however, on several occasions he failed to remove his undershorts before urinating in the toilet. He received all meals at their regular hour this week and spent relatively less time attached to the rope.

Further Procedures At the termination of the study, it was recommended to the cottage personnel that S1 be kept in the crib area for a period of 1 month before returning him to the day room. Such advice was given because the four toilets in the bathroom adjoining the day room were in constant use and, as a result, were not as frequently accessible to the residents as were the toilets in the bathroom adjoining the crib area. S1 was urinating in the toilet so frequently that appropriate urination behavior likely would extinguish in an environment in which toilets are so inaccessible. The cottage personnel were further advised to control the frequency of toilet usage by presenting social reinforcers following appropriate urination at 1-hour intervals.
APPENDIX C
CHRONOLOGY OF S2

This appendix presents a weekly summary of the procedure that was employed to modify the elimination behavior of S2.

**Week 1** S2 was taken from the cottage day room and placed in the crawl room with the other subjects. Sitting on the toilet for 10-minute periods was reinforced with food for six meals. A suppository was used once during this week to elicit a response, which was reinforced immediately. S2 was then put on the toilet at 2-hour intervals during his waking hours. S2 was not placed in a restraining jacket at any time during the first week. It soon became apparent that his continual swallowing of strings was having an effect on his bowel behavior.

**Week 2** All meals were made contingent upon S2's bowel behavior in an attempt to strengthen the association between response and the reinforcer. S2 was retained for the most part in the crib room rather than in the crawl room, the latter being used only after inappropriate bowel elimination. Letting S2 remain in soiled clothing proved ineffective, since he consumed his feces. Initially, S2 was placed in the crawl room immediately following soilings, but this proved ineffective since S2 could climb out of the crawl pen even
though the door was locked. Thereafter, S2 was attached to a short rope in the crawl room following "accidents." This too proved ineffective, since he was able to free himself from the rope. Finally, S2 was placed in a restraining jacket and attached to a short rope in the crawl room following "accidents." He remained there until the next appropriate elimination response. This aversive contingency proved to be effective and was modified for use throughout the application of the procedure.

Week 3 Suppositories were used twice with desirable results early in the week. The frequency of S2's bowel responses increased greatly this week. S2 became sick on the third day of this week, with frequent vomiting and diarrhea. Three bowel movements occurred in S2's undershorts on this day. Two bowel movements occurred the same day when S2 was taken to the toilet. S2's undershorts were removed when he had diarrhea to save laundering them. This resulted in an increase in masturbation, which subsided when undershorts were again placed on him. Showering was discovered to be a possibly useful positive reinforcer when S2 was observed to run to the shower following eliminations both in the stool and in places other than the stool. Hereafter, showers were given at least once a day following bowel movements on the toilet, and they were no longer given following inappropriate responses. S2 was cleaned with a wet cloth following inappropriate responses. On one occasion S2 spent the night in a restraining jacket
after he soiled his undershorts just prior to his bedtime.

**Week 4**  
S2 spent 2 full days and 1 night in the restraining jacket before it was removed following the next appropriate response. E chose to attach S2 to a rope, 10 feet in length, in the bathroom following inappropriate behavior as opposed to retaining him in the crib room. This permitted him to self-initiate eliminations while he remained attached to the rope. S2's undershorts were removed at those times when the jacket was placed on him to enable him to use the toilet without soiling his clothing. Training was undertaken while S2 was attached to the rope to teach him to initiate toilet usage. Shaping techniques were used, and responses that brought S2 closer to the toilet were reinforced with small pieces of candy. At the end of an hour training session, S2 was approaching the toilet on his own initiative. The schedule was then thinned, and ultimately it became necessary for S2 to respond with a bowel movement to receive the reinforcer. Hereafter, the frequency of self-initiated bowel movements rose rapidly.

**Week 5**  
For the first few days of this week S2 remained attached to a rope that allowed him to reach the toilet but not to leave the bathroom. The frequency of self-initiated bowel movements continued to rise. On the first day of the week the number of bowel movements reached a total of 10. Urine was also put on a continuous reinforcement schedule, and S2 quickly began to urinate consistently in the toilet. While S2 remained attached to the rope, the schedule of
reinforcement was thinned for both urine and bowel elimination behavior. After being used for 6 days, the rope procedure was discontinued, and S2 was allowed to play in the crib room and bathroom area. He was returned to a continuous schedule of reinforcement for all elimination behavior. S2 continued to use the toilet consistently for elimination responses. All meals during the week, though minimized, were served at their regular hour.

Week 6 The reinforcement schedule was thinned to a three times a day basis for all eliminating behavior. Showers continued to be administered on a variable interval schedule not exceeding more than two each day. S2 began removing his undershorts and leaving them on the floor following each session on the toilet. This behavior was brought under control by not allowing S2 to leave the bathroom until his undershorts were put back on in the appropriate position.

Week 7 Since S2 was using the toilet appropriately and consistently in the crib bathroom, on the second day of this week he was returned to the cottage day room, and a procedure aimed at generalizing the behavior was put into effect. Initially, he was attached to a rope in this different bathroom for 1 day. He was once again returned to continuous reinforcement, at this point administered by the cottage attendants. E merely checked on S2's behavior about every 2 hours. The response seemingly had generalized, for S2 had four self-initiated bowel movements his first day in this environment. The schedule was
thinned again after S2 had responded consistently for a 3-day period. The first bowel movement in a place other than in the toilet occurred on the fifth day after S2 had been returned to the cottage day room. This behavior occurred while E was out of the cottage. The bowel movement was followed by a shower and clean shorts administered by a cottage attendant seemingly unaware of the prescribed treatment of inappropriate elimination behavior and the strong positive reinforcement effects of showers for this S.

**Week 8** On the second day of this week an inappropriate response again was met with positive reinforcement administered by an attendant. The third day a similar situation occurred. E arrived as S2 was being showered immediately following an inappropriate response. E attached S2 to a rope and placed him in a restraining jacket. He remained in the jacket over night until the first appropriate response the following morning. A third inappropriate response occurred on the fifth day of the week; however, in this instance the cottage personnel immediately attached S2 to a rope and restrained him. While there were no further inappropriate responses recorded for the remainder of the week, 10 appropriate responses were recorded. Attention and approval were the only positive reinforcers used this week. A weight check indicated that S2 had gained 2 pounds during the training procedure.

**Further Procedures** Cottage personnel were advised to restrain S2 and attach him to the rope immediately following all
inappropriate elimination responses. It was also advised that soiled clothing not result in S2's being showered but that he be showered at least once daily following appropriate elimination responses.
APPENDIX D
CHRONOLOGY OF S3

This appendix presents a weekly summary of the procedure that was employed to modify the elimination behavior of S3.

Week 1. S3 became a subject on the third day of the experimental application for reasons discussed on the summary of S1. An attempt was made to increase S3's general activity level, as he previously had spent his waking hours doing little more than sitting. A ball appeared to be a very strong reinforcer, since S3 continually held one in his hand. Initially, S3's handing the ball to E was reinforced by giving S3 small pieces of graham crackers and returning the ball to S3 each time it was given up. By the end of the first day, S3 was rolling the ball back and forth to E without the food reinforcement contingency. The second day this procedure was continued; however, the ball was thrown farther and farther away from S3, who was reinforced with pieces of candy each time he retrieved the ball. Soon S3 would retrieve the ball anywhere it was thrown. S3 was fed his meals on the toilet the first 2 days regardless of his elimination response. Hereafter, his only access to food could be obtained by appropriate use of the toilet. Since prior to the experimental procedure S3 consistently used the toilet to urinate and
defecate when taken, both elimination responses initially were put on a
similar reinforcement schedule. S3 was taken to the toilet every 3 hours,
and if an appropriate elimination response occurred, that response was
reinforced with food or liquid. By the end of the first week S3 was gen­
erally more active, since many of the cottage personnel had spent time
playing ball with him. Not a single inappropriate response occurred,
and S3 consistently responded when placed on the toilet.

Week 2 E began to throw the ball in the vicinity of the toilet
and accompanied S3 when he retrieved the ball. S3 was placed on the
toilet after the ball was retrieved and reinforced following such behav­
ior. Soon, S3 came to sit on the toilet whenever E threw the ball near
the toilet. The reinforcement was then made contingent upon an elim­
ination response while sitting on the toilet. Three days later S3 went
to the toilet on his own initiative and responded with a bowel movement.
S3 frequently pointed to the toilet or to his genital area before initiating
a bowel movement, but this behavior was ignored. Responses were not
reinforced until after S3 had arisen from the floor and eliminated while
sitting on the toilet. S3's general activity level continued to increase
as he began to spend considerable time pushing S1 in a wheel chair.

Week 3 Continuous reinforcement remained contingent on all
appropriate elimination behavior. Attendants reported that on two oc­
casions S3 arose from bed and used the toilet during the night hours.
On the seventh day one of the toilets became obstructed so that it
would not flush without spilling over onto the bathroom floor. S3 had a bowel elimination in this particular toilet and flushed the toilet following the response. S3 was discovered by E covered with bowel movement and crying. It became a necessity to shower and clean S3. Such an aversive condition, however, seemed to have little effect on S3's response rate.

**Week 4** All meals were fed in minimal portions at their usual hour. Candy and juice reinforcers continued to follow appropriate elimination behavior on a continuous schedule. On the first day of the week S3's ball was taken from him by one of the cottage work boys while he was sitting on the toilet. He was discovered crying by E, saying "ball" between sobs. Another ball immediately was given to S3, and he was reinforced as usual for an appropriate elimination response. Again the aversive condition had no noticeable effect on the response rate.

**Week 5** On one occasion S3 refused to get up from a sitting position on the floor to eat breakfast, and as a result he missed the meal. Reinforcement, though of smaller food quantities, remained continuous. S3's general activity level continued to increase as he began playing hiding and finding games with E and several of the cottage work boys. Wrestling with E, attendants, and the work boys also came to occupy a large portion of S3's waking hours.

**Week 6** The schedule of food reinforcement was put on a once a day basis, and by the middle of the week such reinforcers were removed
entirely. Social rewards remained continuous and contingent only upon elimination behavior. On the last day of the week, S3 was returned to the cottage day room where the procedure was continued in an effort to direct his elimination behavior to the toilets in the adjoining bathroom.

Week 7. S3 was put back on a continuous reinforcement schedule for 1 day. He was taken to the stool by an attendant in response to his pointing gestures where a bowel movement occurred. Attendants were advised to ignore such behavior. S3's activity level rapidly declined after he was returned to the day room. In this environment his hiding, wrestling, and ball playing behavior were seldom reinforced by responses from the cottage personnel or from the other children. The daily number of trips to the toilet declined this week, but no inappropriate responses occurred. On two successive days S3 used the toilet only twice. All meals were made contingent upon toilet elimination. S3 soon began to initiate trips to the toilet after the other children entered the dining area. Appropriate elimination responses then were followed immediately by a social reinforcer, such as the words "good boy" and a hug, after which E led S3 to his meal. If S3 did not go to the toilet within an hour before a meal hour he did not receive that meal.

Week 8. All meals remained contingent upon his elimination behavior. S3 arose from his usual sitting position with increased consistency and went to the toilet before each meal. Only one meal was withheld this week. On the fifth day of the week a bowel movement was
discovered in S3’s undershorts. He was placed immediately in a restraining jacket and attached to a rope in the bathroom area. It soon became apparent that S3 was sick, as liquid bowel began to flow down his leg, and S3 began crying. As soon as he was untied and the jacket was removed, S3 sat on the toilet and continued to eliminate. S3 eliminated liquid bowel on four other occasions that day. Anti-diarrhea medication was administered, and S3’s elimination behavior returned to its usual state the following day. S3’s weight at the end of the eighth week indicated that he had lost 1 pound during the period of the project.

**Further Procedures** Cottage personnel were advised to maintain S3’s elimination behavior by continuing to make meals contingent upon elimination responses in the hour previous to that meal. It was recommended that S3 neither be pulled nor in any other way taken to the toilet due to the probability that such behavior would shape his dependence upon others to take him to the toilet.
APPENDIX E
CHRONOLOGY OF S4

This appendix presents a weekly summary of the procedure that was employed to modify the elimination behavior of S4.

**Week 1**  
S4 was placed in the crawl room with the other subjects and taken to the toilet at 2-hour intervals. The first six meals were served while S4 was on the toilet in an effort to reinforce such sitting behavior regardless of the elimination response. A bowel movement occurred when S4 was taken to the toilet on the second day, and this response was followed by food and social reinforcers. S4 had several bowel movements in the crawl room, and in each instance E discovered S4 smearing the feces on the floor or wall and drawing in it similar to the manner in which one finger paints. E then considered the possibility that toilet usage could be aversive to this individual, since it meant the loss of access to his feces, an apparent positive reinforcer. Finger paints and crayons were introduced in an effort to substitute them for the less appropriate painting material. This also proved undesirable because it was more difficult to clean the room after S4 had smeared the paints than it was when feces were smeared. Saliva and urine were used more often by S4 in this "painting" behavior than were feces. By
the end of the first week, E ignored "painting" with saliva or urine but responded to feces smearing by immediately cleaning S4 and removing the bowel movement from the crawl room. After the first week, the smearing of bowel movement subsided and did not occur again for the duration of the project, apparently as a result of the above measure and the increased use of the toilet.

**Week 2** Suppositories were used on two occasions to elicit a bowel movement while S4 was sitting on the toilet. S4 was ill most of this week. On the third day of the week he was put to bed with a fever. By the end of the week, bowel movements were occurring consistently in the interval between 7:00 a.m. and 7:30 a.m.

**Week 3** The morning and noon meals were made contingent upon S4 having at least one bowel movement in the toilet a day. If the bowel movement occurred before the breakfast meal, S4 received his meals as usual. All inappropriate responses led to S4 missing the next meal. If no food had been received by bed time, a 10-minute interval was allowed to elapse from S4's last session on the toilet, and he was then fed a large meal before being put to bed. Suppositories were used twice this week. On several occasions S4 refused to sit properly on the toilet but instead turned around and faced the back of the toilet, resting his buttocks on the most posterior portion of the toilet seat. In each instance S4 was turned around to the appropriate
position, and if he refused to remain on the toilet in that position the session was terminated.

**Week 4** Continuous reinforcement of bowel elimination was maintained. S4 began to urinate in the stool when taken. Such behavior was reinforced by small pieces of candy while bowel responses were reinforced by larger food quantities. S4 rarely was clothed in undershorts in order to prevent wet undershorts from being a source of urine for "painting." Urine that was deposited on the floor was mopped dry immediately. Hereafter, S4's "painting" behavior showed a marked decline.

**Week 5** Inappropriate bowel responses were followed by S4 being attached to a rope of about 10 feet in length, which permitted him to reach the toilet but did not enable him to leave the bathroom area. S4 initiated a bowel movement while attached to the rope the second day of the week. By the end of the week, both inappropriate urine and bowel responses were followed by S4 being attached to the rope. As S4 consistently defecated in the toilet upon awakening in the morning, there were few instances of bowel movement occurring at other times.

**Week 6** Inappropriate elimination behavior that occurred during the night hours resulted in S4 being attached to the rope the following morning. S4 began to defecate consistently in the toilet upon his being awakened in the morning. He responded by urinating in the toilet about half of the total daily number of such responses. It became
apparent that S4 urinated at least once every hour, and as a result of such observations, he was placed on the toilet at hourly intervals.

E noted that S4 was able to deliver a spoonful of food to his mouth after E had filled the spoon for him. Shaping procedures were then applied to spoon-feeding behavior. Each time S4 removed the spoon from his mouth and brought it a little closer to the food bowl, the spoon was refilled for him until S4 came to direct the spoon toward the bowl wherever it was situated. The bowl was then tipped so that the soft food would fill the spoon whenever the spoon was delivered to the bowl. Then the bowl gradually was returned to its normal position requiring S4 to apply more pressure to the spoon every few bites in order to receive a spoonful of food. By the eighth meal following the commencement of this procedure, S4 was spoon feeding himself in a high chair with no aid from E. Hereafter, S4 fed himself at all meals, and undesirable behaviors such as food throwing were diminished by immediately terminating the meal following such behavior.

Week 7 Permission to go to bed after appropriate responses in the toilet was initiated as a possible reinforcer, since S4 spent much of each day asleep on the floor. Training sessions were begun to generate self-initiated toilet behavior. Sitting on the toilet after S4 had been standing for about 20 seconds was reinforced in each instance by small pieces of candy. Eventually, S4 would then go to the toilet from any point in the bathroom when tapped on the shoulder. Following this
procedure. S4 took E's hand on several occasions and led him to the bathroom where S4 sat on the toilet. Such behavior was reinforced on each occasion with pieces of candy. A bowel movement was self-initiated from the crib room on a day when S4 had not responded with his usual morning bowel movement. All meals were given at their usual hour this week. Morning bowel movements were reinforced socially with praise and affection, and S4 was led to his breakfast. On those mornings when no such response occurred, breakfast was delayed half an hour. All appropriate elimination responses that occurred at other times were reinforced in each instance.

Week 8 Undershorts were again placed on S4. Urination was consistently emitted in the toilet. Inappropriate elimination responses resulted in S4 being attached to the rope for only 1-hour intervals or until an appropriate response occurred, whichever came first. This procedure became necessary when S4 emitted an inappropriate response while he was attached to the rope. Freeing him from the rope after an hour interval had passed lessened the possibility of such an event occurring. Those few instances in which S4 responded inappropriately while attached to the rope led to the further aversive condition of his being placed in a restraining jacket. Once again this week S4 self-initiated the only bowel movement that did not occur when he was taken to the toilet in the morning. On the last day of the week the rope was not used at all, since S4 remained dry the entire day.
Further Procedures  Cottage personnel were advised to put S4 on the toilet as soon as he awakened each morning. It was further recommended that he be attached to the rope for 1 hour following inappropriate responses. Self-initiated responses were to be kept on a continuous schedule of food and social reinforcement for a period of 1 month before the schedule was to be thinned to a one a day basis. Then the schedule was to be thinned to a three times a week basis, after which the attendants were to entirely dispense with food reinforcement.
APPENDIX F
CHRONOLOGY OF S5

This appendix presents a weekly summary of the procedure that was employed to modify the elimination behavior of S5.

**Week 1** S5 cried frequently the first week. The first six meals were fed on the toilet regardless of the elimination response. It was necessary to tie S5 in the training chair even at this time to maintain his sitting behavior. S5 refused many of his meals the first week. A suppository was used on one occasion to elicit an appropriate response, but the reinforcer was refused following the response. E observed S5 eating his feces on the fifth day of the week. Hereafter, S5 was cleaned immediately after bowel movements that occurred in places other than in the toilet.

**Week 2** Suppositories were administered twice to elicit bowel responses; however, S5 refused the food reward on both occasions. Even though all food was made contingent upon bowel elimination, S5 rarely accepted food following an appropriate response. A positive reinforcer was yet to be found. S5 did not respond favorably to the usual social reinforcers, such as a hug or a pat, and even cried when held in the arms of an adult.
Week 3 Suppositories were administered four times, and in three instances S5 accepted the food that followed. The total food intake remained contingent upon S5's bowel elimination behavior. It was still necessary to tie S5 in the training chair, since he continued to get up immediately after he was placed on the toilet. At the end of 21 days, only three bowel movements had been emitted without the aid of a suppository. Suppositories continued to be administered, however, in order to insure that S5 was fed each day. Various objects such as dolls, balls, and other toys were given to S5 in an attempt to locate a strong positive reinforcer. S5's family brought a box of toys with which he had played when living at home, but S5 did not respond to any of the objects.

Week 4 Suppositories were given three times, and each time S5 accepted the food reinforcers. He was tied in the training chair on the third morning of the week, and E proposed to leave him on the training chair until a response occurred. However, no bowel response was emitted. This procedure was repeated a second day, again without success. The same procedure was undertaken a third day, and after a total of 36 waking hours on the toilet without a bowel response, a suppository was given. Twenty-eight days had now passed, and only three bowel movements had been produced in the toilet without the use of a suppository.

Week 5 S5 was now fed as much food as he would eat each morning, and all other food remained contingent upon the appropriate
bowel response. Suppositories were given on 3 days, and the food reinforcer was accepted each day. S5 sat in the training chair (but not on the toilet seat) for long periods without the necessity of his being tied. On three occasions S5 got up from the chair and had a bowel movement along the side of the toilet. In each instance he was observed smearing the feces on the bathroom floor. Hereafter, bowel movements in places other than the toilet resulted in S5 being attached to a 4-foot rope, permitting him to get on and off of the training chair. Thirty-five days had passed with only the three responses being produced in the toilet without the aid of suppositories.

Week 6 Milk of magnesia was administered on the first day of the tenth week in an attempt to increase the frequency of the bowel elimination response. Four bowel movements occurred on this day, and half of them were emitted while S5 was seated in the training chair. On the seventh day of the week, S5 pulled the training chair off of the toilet and walked into the crib room where he defecated in a high chair while the smaller chair was still strapped to his waist. Since no effective positive reinforcing stimulus could be found, E began to apply aversive contingencies to inappropriate behavior. Following an inappropriate bowel response, S5 was placed in a restraining jacket in addition to being attached to the four foot rope. E was doubtful as to how aversive this stimulus condition was, for S5 spent much of each day in the jacket, yet he placed one of his feet in and out of the toilet bowl with a grin.
generally on his face. A shower appeared to be an aversive condition for S5. He usually cried while being showered. Showers also came to be contingent upon inappropriate behavior but were not administered when S5 responded with a bowel movement in the toilet. Suppositories were no longer used to obtain a response.

**Week 7** After S5 had defecated twice more on the bathroom floor, a blindfold was put on him in addition to the jacket. This stimulus seemed to be aversive, as S5 cried with it on. Hereafter, a simple Halloween mask with the eyes taped closed was placed on S5 along with the restraining jacket immediately following inappropriate responses. The mask was allowed the remain on S5 for 5 minutes, after which he was showered and then attached to the rope with the jacket remaining on for a 1-hour interval. Soon after this procedure was employed, S5 began to run and sit on the toilet (not the training chair) as soon as the mask was removed and the shower was completed. Since he began to emit urine while sitting on the toilet, urination in the toilet was also reinforced. Appropriate elimination behavior continued to be followed by food, usually ice cream. All meals were now fed in minimal portions at their regular hour. The first self-initiated bowel movement was recorded this week.

**Week 8** S5 was clothed in undershorts for the first full week. It was discovered that he smiled when S1 pushed him in a wheel chair. Hereafter, he was pushed in the wheel chair whenever an appropriate
response occurred. By the third day of the week, S5 had responded with only one inappropriate bowel movement and had directed all but one urinating response in the toilet. Inappropriate responses continued to be followed by the aversive contingency.

Further Procedures The cottage personnel were advised to maintain the aversive contingencies until a period of 2 weeks had elapsed without an inappropriate response. They were further advised to reinstate the aversive contingency if the rate of the inappropriate elimination response exceeded a total of two per week.
LIST OF REFERENCES


SHERMAN, J. A. Use of reinforcement and imitation to reinstate verbal behavior in mute psychotics. J. Abnorm. Psychol., in press.