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APPLICATION OF OPERANT CONDITIONING PROCEDURES TO THE BEHAVIOUR PROBLEMS OF AN AUTISTIC CHILD

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Summary—An account is given of the treatment of a pre-school child who had serious behavioural and physical handicaps. In a sense this is a study involving both psychotherapy and rehabilitation. The treatment consisted of applying laboratory-developed techniques through the attendants and the parents over a seven-month period.

INTRODUCTION

DURING the past few decades an experimental analysis of behaviour has produced several powerful and reliable techniques for controlling behaviour (Holland and Skinner, 1961). Although these procedures were originally established with lower organisms, they are increasingly being applied in areas concerned with human behaviour (Ayllon and Michael, 1959; Baer, 1962; Bijou, 1963; Ferster, 1961; Isaacs, Thomas, and Goldiamond 1960; Lindsley, 1962; Williams, 1959; Zimmerman and Zimmerman, 1962). Even so, techniques developed for dealing with specific human anomalies are limited.

This case study is an example of the application of behavioural principles to psychopathology. We developed techniques for dealing with the behaviour problems of a hospitalized pre-school autistic boy. Each of the techniques was derived from procedures developed and studied in experimental laboratories, such as handshaping, extinction, food deprivation, time-out from positive reinforcement, and discrimination training.

Dicky, the subject, was 3½ years old when the study began. He is the son of middle socio-economic class parents and has one younger and two older apparently normal female siblings.

From hospital records it appears that Dicky progressed normally till his ninth month, when cataracts were discovered in the lenses of both eyes. At this time severe temper tantrums and sleeping problems began to develop. During his second year he had a series of eye operations which culminated with the removal of his occluded lenses. This made wearing of glasses necessary. For more than a year his parents tried, and failed, to make Dicky wear glasses. During this time Dicky was seen by a variety of specialists who diagnosed him, variously, as mentally retarded, diffuse and locally brain-damaged, and psychotic, with the possibility of such additional anomalies as phenylpyruvic oligophenia and hyperthyroidism. One recommendation was that he be placed in an institution for the retarded since his prognosis was so poor.

Dicky did not eat normally and lacked normal social and verbal repertoires. His tantrums included self-destructive behaviours such as head-banging, face-slapping, hair-pulling and face-scratching. His mother reported that after a severe tantrum "he was a

mess, all black and blue and bleeding". He would not sleep at night, forcing one or both parents to remain by his bed. Sedatives, tranquilizers, and restraints were tried, without success.

He was admitted to a children's mental hospital with the diagnosis of childhood schizophrenia at the age of three. After three months of hospitalization the terminal report stated that there was some improvement in his schizophrenic condition but no progress in the wearing of glasses. A few months later his ophthalmologist predicted that unless Dicky began wearing glasses within the next six months he would permanently lose his macular vision. At this point the authors were invited in as consultants by the hospital staff for the purpose of training Dicky to wear glasses.

After observing a 20 min interaction between Dicky and his mother, a period occupied by almost continuous tantrums, we recommended that he be readmitted to the hospital in order to separate him from his mother temporarily and to deal with his disruptive behaviours, while training him to wear glasses.

Our prescribed operations were carried out by the attendants and the parents both on the ward and in the home. In addition to general comments we carefully specified behaviours and environmental events to be recorded on Dicky's chart and in notes from the parents. As the specific events to be recorded were highly distinctive and co-operation by the attendants and parents was good, the data presented probably reflect actual events to a large but undetermined degree.

By manipulating the consequences of the behaviours, we concurrently developed techniques for dealing with Dicky's tantrums, sleeping and eating problems, for establishing the wearing of glasses, and appropriate verbal and social behaviour.

PROCEDURES, RESULTS AND DISCUSSION

Temper tantrums

There is some evidence that temper tantrums will succumb to extinction (Williams, 1959). However, under ward conditions, with personnel untrained in these procedures, it was far from certain that extinction would be reliably carried out. So the prescribed procedure was a combination of mild punishment and extinction. Dicky was placed in his room contingent upon each tantrum, the door remaining closed until the tantrum behaviour ceased. Each occurrence was to be noted on his chart.

Such a procedure, although initially involving social contacts and thus possible reinforcement at the onset of a tantrum, eliminated the possibility of continuous contact throughout the undesired behaviour. This procedure also provided for differential reinforcement of non-tantrum behaviour by the door being opened contingent upon such behaviour. Such a contingency, involving the removal of all social reinforcers for a period of time, resembles Ferster and Appel's (1961) use of a time-out from positive reinforcement as an aversive stimulus.

A cumulative record showing the frequency with which Dicky was placed in his room for tantrums and self-destructive behaviour is presented in the upper graph of Fig. 1. The curve is, however, partially artifactual. The record shows a constant rate of being placed in his room for tantrums during the first four months, indicating a lack of change in behaviour during this period which was contradictory to casual observation.

Several variables, each involving a sacrifice of experimental rigor, contributed to this discrepancy:

(1) When Dicky was first admitted he whined, cried, slapped himself frequently. The attendant was therefore instructed to place him in his room only when he was engaging in two or more of these behaviours simultaneously. As Dicky's behaviour improved, the attendants lowered the original criterion finally to include any atavism. Since the authors believed this was to the distinct advantage of the child, the criterion change was encouraged.

(2) During the first few weeks the attendants' records contained reports of elaborate explanations offered Dicky as he was escorted to his room, and of tender, practically tearful apologies and fondling after the door was reopened. This pattern evolved to a perfunctory trip to the room with the door simply being reopened at the end of the tantrum, presenting a ward going on much as before.

(3) By the beginning of the third month, tantrums lasting less than five minutes began to occur frequently, creating the likelihood that the trip to the room would become a socially reinforcing event. A minimum time of ten minutes in the room was therefore imposed.

(4) Dicky's contact with his family and home progressively increased during this time. The major changes are indicated in the tantrum curve.
At (a) Dicky's parents were permitted their first one-hour visit. Subsequently they made several scheduled visits a week, during which an attendant observed and instructed them in their handling of Dicky.
At (b) the father put Dicky to bed on the ward for the first time.
At (c) Dicky began wearing his glasses.
At (d) the mother put Dicky to bed on the ward for the first time.
Midway between (d) and (e) Dicky began short home visits accompanied by the attendant.

At (e) Dicky spent his first night at home.

At (f) Dicky spent a second night at home.

After (f) he spent an average of three nights a week at home, increasing to five nights a week during the final month.

Some estimate of the decreasing severity of the tantrums is indicated in the middle cumulative record of Fig. 1. Each step represents a tantrum, either during the day or at bedtime, involving head-banging, hair-pulling, or face-scratching. Such severe self-destructive behaviour remained near zero after the first two and a half months. The remainder of the tantrum record consists of face-slapping, whining, and crying.

Conditions for handling tantrums at the home were made comparable to those on the ward. The attendants coached the parents to deal with Dicky's tantrums by putting him in his room both on the ward and at home. The descriptions of the parents' behaviour by the attendants and by the parents themselves indicated that this training was effective.

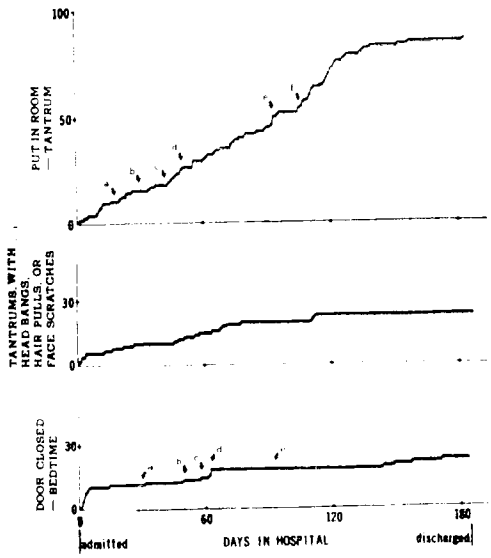

FIG. 1. Three cumulative records showing the effects of extinction and mild punishment (time-out from positive reinforcement) upon the tantrums, severe self-destructive episodes, and bedtime problems of a hospitalized pre-school autistic boy.

Bedtime problems

The bedtime problem was handled in a manner similar to the tantrums. Dicky was bathed at a regular hour each night, cuddled for a short time, put to bed, and left with the door open. If he got up, he was told to go back to bed or the door would be closed. If he remained up, the door was closed. The door was reopened after a short time, or if a tantrum occurred, after it subsided. He was told again to get in his bed. If he stayed in bed the door was left open. Each door-closing at bedtime was recorded.

The lower graph in Fig. 1 shows cumulative bedtime door-closings. The door was closed several times during the first five nights. The resulting tantrums were quite violent, one series totalling more than an hour. On the sixth night the attendant tucked Dicky in and said goodnight. Dicky remained in bed and soon went to sleep. Bedtime was seldom a problem again.

At (a) the father first put Dicky to bed on the ward.
At (b) the mother first put him to bed.
From (b) to (e) the parents put Dicky to bed once or twice a week.
At (c) and (d) the parents had to shut the door.
At (e) Dicky spent his first night at home. For a few weeks prior to this, he had been making short home visits accompanied by an attendant. Several days prior to (e) he was taken home in the evening, and after a few minutes of play, went through the routine of getting ready for bed with his siblings. The attendant then brought him back to the ward and put him to bed. Since this trial run was successful, he was sent home to spend the night several days later at (e). He was bathed and put in bed. After about thirty minutes he was heard humming to himself. The mother started to go in to Dicky but the attendant dissuaded her. Fifteen minutes later, Dicky was asleep.

Over the next three months, until his release from the hospital, Dicky spent a progressively greater proportion of his nights at home. One night a week an attendant went along to observe both Dicky and his parents.

The four times the door had to be shut after point (e) all occurred at home. These may have been the result of a certain amount of reshaping by the parents during a period when Dicky had chronic diarrhoea.

Wearing glasses

Shaping (Skinner, 1953) was the basic procedure used to get Dicky to wear his glasses. Our shaper, an attendant, was instructed to spend two or three twenty-minute sessions each day, with the subject in the subject's room.

During the first several sessions a conditioned reinforcer was established by having the clicks of a toy noisemaker followed by Dicky's receiving small bites of candy or fruit. The click soon became a discriminative stimulus and after each click Dicky would go to the bowl where the reinforcers were placed.

Since Dicky had worn the prescription glasses for a few seconds on at least one occasion and had not left them on, it was assumed that wearing them was not immediately reinforcing. The glasses might even have been mildly aversive, since they would drastically change all visual stimuli, as well as force the eyes into greater accommodation. Also, glasses with the full prescription had been paired in the past with attempts to physically force glasses-wearing.

For these reasons we decided not to begin with the actual prescription glasses. Instead, several empty glasses frames were placed around the room and Dicky was reinforced for picking them up, holding them, and carrying them about. Slowly, by successive approximations, he was reinforced for bringing the frames closer to his eyes.

The original plan was, after he was wearing the lenseless frames, to introduce plain glass and then prescription lenses in three steps of progressing severity. This was not the actual sequence of events, however, since our shaper met with considerable difficulty in getting Dicky to wear the glassless frames in the proper manner, i.e. with the ear pieces over instead of under the ears and the eye openings in line with the eyes. Furthermore, it was impossible to help place the frames correctly since Dicky became upset when anyone touched any part of his head.

The slow progress was probably attributable to two factors. First, the attendant, although co-operative, was inexperienced and imprecise with the shaping procedure. Secondly, due to the reluctance of the ward staff to deprive the child of food we began with reinforcers such as candy and fruit. It soon became obvious, however, that, at least for this child, these were rather weak reinforcers.

After the first two weeks we attempted to increase deprivational control by using breakfast as a shaping session, bites of breakfast now being dependent upon approximations to the wearing of glasses. Two weeks later we added to the glasses larger adult ear pieces and a "roll bar" which would go over the top of his head and guide the ear pieces up and over the ears.

At the end of the fifth week Dicky was still not wearing the ear frames appropriately; so the authors, who had not previously spent any time shaping the subject themselves, spent the major portion of a day directing the shaping procedure.

A second bar was added to the back of the glasses. Now, they fit like a cap and would not slide off readily. As usual the breakfast session was not particularly effective. Lunch was also used as a session, but still there was no progress.

Later, at approximately two o'clock that afternoon, we had a third session. Dicky had received very little to eat all day, just a few pieces of dry cereal, and was most interested in the ice cream we brought to the session. We also decided to try the full prescription lenses. At the beginning of the session it was quite obvious that our reinforcers were much more powerful than earlier in the day. He carried the glasses at all times, often putting them up to his face, although not in the desired manner. However, since there was a great deal of the approximate kind of behaviour it was easy to differentially reinforce the two aspects of wearing we wanted, placing the ear pieces straight over the ears, and looking through the lenses. At the end of approximately thirty minutes Dicky was holding the ear pieces properly over his ears, and the nose piece at the tip of his nose. He was looking through the lenses at such objects as a ring, a clicker etc., that were displayed in the hopes of maintaining his looking behaviour. After this, progress was rapid and he was soon wearing his glasses continuously during the meal sessions in his room.

After wearing the glasses was established in these sessions, it could be maintained with other, less manipulable reinforcers. For example, the attendant would tell Dicky, "Put your glasses on and let's go for a walk". Dicky was usually required to wear the glasses during meals, snacks, automobile rides, walks, outdoor play etc. If he removed the glasses, the activity was terminated.

The progress of glasses-wearing is presented cumulatively in the upper graph of Fig. 2. At the time of Dicky's release from the hospital he had worn the glasses for more than 600 hr and was wearing them about 12 hr a day.

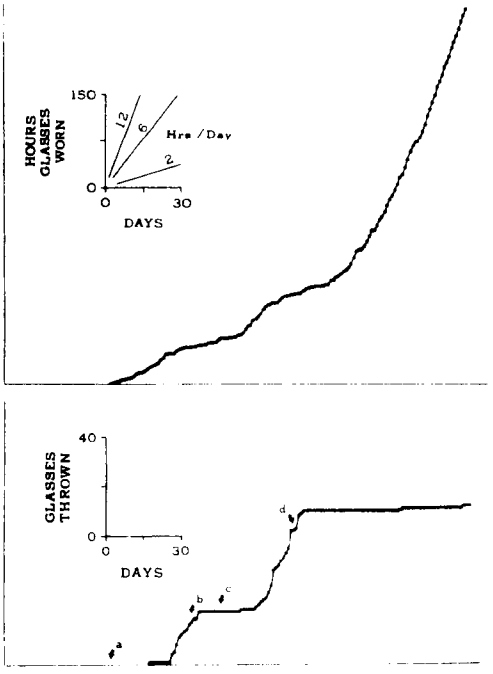

FIG. 2. Two cumulative records showing the effects of positive reinforcement (bites of meals etc.) upon glasses-wearing and the effects of extinction and mild punishment (time-out from positive reinforcement) upon the glasses-throwing of a hospitalized pre-school autistic boy.

Throwing of glasses

The lower cumulative record in Fig. 2 depicts the course of a problem that grew out of wearing glasses, namely, throwing the glasses. Wearing the glasses began at (a). Two weeks later Dicky threw his glasses for the first time. A week later he began throwing them approximately twice a day. Although this in itself was not a serious behaviour problem, it was moderately expensive due to breakage, and there was the danger that, once home, it would be reinforced by the mother's ineffectual fussing and thereby increase the frequency of throwing to a degree incompatible with wearing the glasses. We therefore attempted to develop a technique to control it. Beginning at (b) Dicky was put in his room for ten minutes following each glasses-throw, or if a tantrum developed, until it ceased. Throwing the glasses decreased to zero in five days. At (c) the conditions were reversed: he was no longer to be put in his room for throws. After about three weeks the rate of throwing the glasses resumed its earlier high level. At (d) he was again put in his room for throwing his glasses, and six days later the rate reached and remained near zero.

Verbal behaviour

After the wearing of glasses was established we developed a technique for generating a verbal repertoire. The technique also aimed at maintaining the wearing of glasses and reinforcing visual attending. Like the glasses training, the verbal training consisted of sessions in which an attendant administered food reinforcers. Initially, we tried candy and fruit but these were unsuccessful. Only when we began using breakfast and lunch as training sessions did we have rapid and dramatic effects.

Dicky had no socially appropriate verbal behaviour and, according to his parents, neither his verbal nor non-verbal behaviour was under their verbal control. However, Dicky was far from mute. He had some long and complex verbal chains such as songs (*Chicago*, for example) and occasionally he would mimic quite clearly, but the mimicking could not be evoked under normal conditions.

Our training began with the attendant presenting, one at a time, five pictures (a Santa Claus, a cat etc.). The attendant would say, "This is a cat", "Now, say cat", and so on, until Dicky mimicked her, whereupon she would say, "Good", or "That's right" and give him a bite of his meal. After several more days of differential reinforcement the attendant gradually omitted saying the word first and Dicky would usually say the word in the presence of each picture without a prompt. In three weeks he did this in the presence of about ten pictures. We than progressed to picture books, common household objects, and finally to remote events, for example, "Where are you going tonight?", "What did you do outside?"

The more powerful food reinforcers were evidently necessary for initial strengthening, but weaker conditioned reinforcers, such as adult attention and approval, were effective for maintaining and expanding the original repertoire. The parents, although reluctant at first, were trained by the attendant to use the same technique at home. They have expanded his repertoire to include, for instance, the correct usage of personal pronouns, and Dicky now initiates requests and comments without adult prompting. However, his present verbal behaviour is by no means comparable to that of a normal five-year-old child.

Dicky's ability to mimic entire phrases and sentences was apparently crucial to the rapid progress in verbal training. The authors' current work with other children indicates that without this mimicking behaviour a long and arduous handshaping procedure would have been necessary to establish responses of the required topography (words, phrases, and sentences) prior to the discrimination training described above.

Eating problems

During those meals which Dicky ate with the rest of the children in the dining room, he would not use silverware, would snatch food from the other children's plates and would throw food around the room. We attempted to deal with these behaviours by having the attendant remove Dicky's plate for a few minutes whenever he ate with his fingers and, after a warning, remove Dicky from the dining room (and the remainder of his meal) whenever he would throw food or take food from other's plates. Dicky spent an average of 55 per cent of the mealtime inappropriately eating with his fingers. During one meal his plate was removed several times, and he was told to use his spoon. After this, and in all subsequent meals he used a spoon for all appropriate foods. It was only necessary to warn Dicky and send him from the dining room a few times to completely eliminate food-stealing and food-throwing.

Probably as the result of being consistently paired with the aversive consequence of being put in his room, such verbal stimuli as "No", "Stop that", or "If you do that again you'll have to go to your room", came to suppress much undesirable non-verbal behaviour. This type of control also seems important for normal child development.

According to a report from the mother six months after the child's return home, Dicky continues to wear his glasses, does not have tantrums, has no sleeping problems, is becoming increasingly verbal, and is a new source of joy to the members of his family.

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