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ELIMINATING SELF-INJURIOUS BEHAVIOR BY EDUCATIVE PROCEDURES

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Summary—Self-injury is a common problem among autistic and severely retarded persons. The most effective treatment has been pain-shock punishment. To provide a possible alternative treatment, modifications were made in previously developed treatments for autistic behavior. The revised method included positive reinforcement for non-self-injurious behavior, a period of required relaxation or incompatible postures upon each occurrence of a self-injurious episode, and a hand-awareness training procedure. The treatment procedure was used with 11 clients, ten of whom were very severely retarded. No clients were excluded. The mean number of self-injurious episodes was reduced by 90 per cent on the first day, by 96 per cent at the end of one week and by 99 per cent by the end of three months. For four of the clients self-injury was eliminated almost entirely. The new procedure appears to be an effective method of treating self-injurious behavior and avoids the general reluctance to use pain-shock.

Self-injurious behavior by the profoundly retarded or mentally ill is one of the most severe psychological disorders since physical injury always results and sometimes, even death, if ignored. Yet, this problem persists in spite of a large number of recent reports of effective treatment by learning therapy procedures. One frequently used method is pain-shock punishment which has been effectively used by Risley (1968), Tate and Baroff (1966), Yeakel *et al.* (1970), Corte, Wolf and Locke (1971), and see review by Bucher and Lovaas (1968). A second method of treating self-injury is timeout from positive reinforcement which has been used effectively by Wolf, Risley and Mees (1964), Hamilton, Stephens and Allen (1967), Myers and Deibert (1971), Wolf *et al.* (1967), but has been fairly ineffective in studies by Corte, Wolf and Locke (1971), Risley (1968) and Tate and Baroff (1966). In a few instances, effective treatment has resulted from a third method, that of reinforcement for non-injurious behavior (Lovaas *et al.*, 1965; Lane and Domrath, 1970; Peterson and Peterson, 1968).

Unfortunately, the general applicability of the above treatments is an open question since all of the above reported applications have been case studies in which only one selected client was used, except for two reports where the same method was used with three clients (Bucher and Lovaas, 1968) and four clients (Corte *et al.*, 1971). Also, most of the studies have eliminated the self-injurious behavior during restricted time periods of an hour or less per day. Exceptions are the all-day elimination obtained by Tate and Baroff (1966), Hamilton *et al.* (1967), Wolf *et al.* (1964).

Of the three methods, shock seems to have the advantage of extreme rapidity in eliminating self-injury, often within 1 hr. Perhaps the greatest restraint on the use of shock

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has been the reluctance of therapists to resort to this physical punishment (see discussion by Bucher and Lovaas, 1968, and Risley, 1968). As Lovaas and Bucher have stated, regarding the use of shock-punishment by the ward staff members, "all have approached the task with extreme reluctance and anxiety" (p. 140). In addition, the spectre of a ward attendant carrying an electric prod discourages the widespread use of this demonstrably effective and rapid treatment.

The alternatives to shock have been less satisfactory. Physical restraint by tying the client to a chair (Lane and Domrath, 1970) is not as rapid a treatment as shock and also suffers from the characteristic of being excessively aversive. Timeout from positive reinforcement has not been as rapid or as effective as shock and seems to suffer from the disadvantage that the client can continue to injure himself during the timeout, thereby precluding its use with severe self-injury (Corte *et al.*, 1971). Reinforcement of incompatible behavior has the advantage of being totally non-aversive but has not been used effectively alone, only in combination with other methods (Lane *et al.*, 1970, and Lovaas *et al.*, 1965).

The present study devised a new treatment program based largely on three recently developed procedures that appear to hold promise as a relatively non-aversive treatment for self-injury. The first method is that of Autism Reversal (Azrin, Kaplan and Foxx, 1973; Foxx and Azrin, 1972) which has been found to be effective as a general treatment for autistic behavior, of which self-injury may be considered a sub-class and is based on the Overcorrection principle (Foxx and Azrin, 1972; Foxx and Azrin, 1973). In the Autism Reversal procedure, the client is required by instruction and manual guidance to engage in several different fixed postures which are non-self-stimulatory. This required practice is given upon each self-stimulatory episode on a response contingent basis. When the client is not self-stimulating, he is given positive reinforcement for alternative, incompatible activities. The second promising method, the Required Relaxation procedure, is also derived from the Overcorrection principle, and has been effectively used to eliminate a variety of agitative-disruptive behavior, including one client who injured himself (Webster and Azrin, 1973). This Required Relaxation procedure was found to be especially favored by hospital ward staff as a humane and meaningful type of treatment. The third promising procedure was Hand-Awareness Training. In a recent treatment developed for eliminating nervous habits of normal clients (Azrin and Nunn, 1973), the lack of awareness by the client of the location of his hands seemed to be contributing toward nervous habits involving the hands. Consequently the normal clients were given training in being continually aware of the position of their hands as part of the treatment. Since self-injury almost always includes striking oneself with the hands, the Hand-Awareness Training might be expected to help the self-injurious client to control this problem.

The present study modified these three promising procedures of Required Relaxation, Autism Reversal, and Hand-Awareness Training for use with a larger number of self-injurious clients in an attempt to eliminate self-injury on an all-day basis.

METHOD

Clients

Eleven clients were obtained in response to an offer to several institutions to provide assistance in treating clients who repeatedly inflicted injury on themselves that resulted in evident tissue damage. No clients were excluded. Five were from the same institution,

the remaining six from four other institutions. Treatment was given in the client's institution. Table 1 shows the age, sex, diagnosis, IQ, years of institutionalization, years of exhibiting self-injury, the type of self-injury and the frequency of the behavior. Ten clients were diagnosed as severe or profoundly retarded, having an average IQ of 13, the highest IQ being 26 and the lowest was 6. The 11th client was diagnosed as schizophrenia, childhood type with an IQ of 89; he exhibited many of the diagnostic signs of autism. The retarded clients had an average age of 30 yr with an average duration of institutionalization of 18 yr, all having been institutionalized before the age of 15. Self-injury was reported to have been a problem for an average of 12 yr except for the schizophrenic boy who developed the problem only a year earlier. One noteworthy instance was the 18-year-old female who was reported in her records to have started hitting her head against the sides of her crib at 2 yr of age and had evidently self-inflicted scratches on her cheeks and ears during her first year of life. All clients had visible swelling and most also had scratches, scabs, bruises, or open wounds. All clients struck themselves on the face or head or on one part of their head such as the ears, side of the face, or eyes, usually with their fist or open hand. In addition, 2 clients banged their head on a floor or wall (listed as head-banging in Table 1), one of them as his predominant method of self-injury. Five of the clients had been given protective clothing such as a helmet or gloves or put in physical restraints such as special jacket or wrist restraints. Ten of the 11 clients were receiving tranquilizing or sedative medication. For 4 of the clients, treatment has also been given previously in the form of Electro Convulsive Shock therapy or timeout seclusion, or manually holding the client's hands behind the back. For 2 of the clients, the ward staff was only mildly interested in treating the problem. For one of these clients they felt that the protective helmet was adequately preventing self-injury; for the other client, the problem of eye-gouging usually was subordinated to other pressing ward problems.

Recording

The extent of self-injurious behavior prior to treatment was directly recorded by observing the client for as long as was feasible. For 2 clients who were in restraints or protective clothing, the restraint or clothing was removed and the client observed until the self-injury responses appeared to be causing damage. For one of these clients, only 10 min of observation was feasible; for the other, 38 min. For the other 9 clients, the duration of observation was adjusted to the frequency of the behavior. One client who hit himself continuously was observed for 30 min, whereas another client who had a few episodes per day was observed for 8 hr per day for 12 days, by a time-sample procedure. A response was considered self-injurious if the client struck, bit or scratched himself. The nature of the behavior was so unusual that the observers felt little difficulty in differentiating these self-injurious actions from normal on-going activities. In every instance, the ward staff reported that the recorded frequency was representative of the client's usual frequency. For one client, the self-injurious response was static, namely pressing her hand hard against her eyeball; this response was recorded in terms of duration. When the self-injury consisted of spaced blows, the measure was number of blows. If the self-injury consisted of a rapid flurry of blows, the measure was the number of such episodes (see last column of Table 1).

Response detection

After treatment was initiated, two instructors continually observed the client for about 12 hr/day for the first 2 or 3 days, always keeping the client in full view, and within arms'

Table 1. Description and frequency of occurrence of the self-injurious behaviors for each of the 11 clients

Client age and sex	Diagnosis	IQ	Years inst'd	Years exhibiting self-injury	Nature of injury	Pre-treatment frequency of behavior
28-yr-old male	Mentally retarded profound	11	22	14	face hitting, self-choking, biting, kicking	32/day
44-yr-old female	Mentally retarded profound	8	31	6	face slapping	6/day
26-yr-old female	Mentally retarded severe	26	19	6	scratching, face slapping	9/day
25-yr-old male	Mentally retarded profound	14	20	20	face and head slapping, punching	748/day
32-yr-old female	Mentally retarded profound	6	19	8	eye gouging	86% of the day
46-yr-old female	Mentally retarded profound	11	31	31	face, arm, leg slapping, finger biting	200/day
24-yr-old male	Mentally retarded profound	12	14	20	hand biting, head hitting and banging	25/day
10-yr-old male	Mentally retarded profound	9	9	7	ear punching	3528/day
18-yr-old female	Mentally retarded profound	6	18	18	face, ear, and head slapping	3500/day
15-yr-old male	Schizophrenia, childhood type	89	3	0.65	face punching	48/day
17-yr-old male	Mentally retarded profound	8	8	7	head banging	41/day

length since the instructors were required to give continuing positive reinforcement for appropriate non-injurious behavior. Members of the ward staff assisted the instructors in recording and carrying out the treatment during these first few days and were encouraged to assume this responsibility when the instructors were absent. For 5 of the clients, the special instructors were present for at least 2 weeks. For the other 6 clients who were at remote institutions, the instructors returned periodically for direct confirmatory observation of reported benefits.

Duration of treatment

On each ward, the special instructor taught those employees who were interested how to conduct the procedure and supervised their performance. The instructors role-played the procedure with the staff members prior to application of the procedure to a client. The staff was advised of the importance of using the procedure immediately upon detection of a self-injurious response and upon every self-injurious response. One ward employee was typically designated as the coordinator but all were instructed to record the self-injur-

ious behavior and to initiate the treatment procedure. The ward staff was advised to continue the treatment for several weeks after the special instructor departed but his role was advisory only. Telephone contact was made daily with the employees to encourage their continuation of the treatment. For all clients, the treatment lasted for at least 12 days. For 4 clients, the ward employees were not motivated to continue the procedure after the special instructors were absent. The ward employees discontinued treatment for 1 client after 12 days, another after 1 month, and the third and fourth clients after 2 months.

Positive reinforcement for outward-directed activities

The client was given positive reinforcers for engaging in a variety of outward-directed and incompatible responses. For the clients whose behavior was most 'inner-directed' these activities included eye contact with the instructor, looking at specific objects when instructed, sitting down or arising from a chair when instructed, walking, banging drumsticks together, grasping the armrests of their chair, catching and throwing a ball, or even simply sitting still without injuring themselves. For the clients who were more 'outward-directed', the responses included playing with a jig-saw puzzle, educational games, toileting, dressing, grooming, washing oneself, word recognition, ward cleaning chores, making beds, trips to the ward commissary, playing with simple music-making instruments, group recreational activities, swimming at a local pool, and bus rides. The guiding principle was to select those responses that involved active interaction with the physical and social environment, especially responses that were functional and could be expected to be maintained later because of their potential enjoyment or utility in their own right. If the ward program included regular supervised activities or classes, every attempt was made to enroll the client in these activities or classes. The reinforcers selected for use included verbal praise, back-stroking, and desired snack items such as candy, pudding, coffee, and juice. The ward staff usually knew what was reinforcing for a given client. In general, the snack items proved to be the best reinforcers for the more inward-directed clients. Reinforcers were delivered very frequently at first, the verbal praise was almost continuous. Once the client began spending extended periods without self-injury, the reinforcers were made more intermittent by reinforcing for longer response sequences.

Required Relaxation

The Required Relaxation was essentially the same as described elsewhere as a treatment for agitative–disruptive conduct (Webster and Azrin, 1973). When the client injured himself, he was told that he was over-excited and agitated and was required to go relax in his bed. He was assisted in putting on a hospital gown and directed to his own bed where he remained for 2 hr. The instructor stood behind the head of the bed and assured that the client did not leave the bed.

A modification in the previously described procedure was made because of the severe nature of the self-injurious conduct. The client was required not only to remain in bed but to maintain his arms in an extended downward position with the hands alongside his legs away from his head, a position that was incompatible with striking one's head. The instructor used verbal instruction and gentle manual guidance, according to the Graduated Guidance Method which provides no more manual contact than is minimally necessary to obtain the required posture. This gentleness of contact as prescribed by the Graduated Guidance procedure was essential; otherwise great resistance resulted. His fixed posture was required for an uninterrupted 10 min in this arms-extended position. If

he moved his hands toward his head or hit himself, 10 more min were required. All clients required considerable manual guidance initially, but after 1 or 2 days they usually performed the Required Relaxation Procedure upon verbal direction and with minimal manual contact. After the client began spending several hours on the ward without injuring himself, the Required Relaxation was given for any emotional or agitated conduct that was found to be a usual precursor to self-injury, such as excitedly pacing or rocking, muttering, screaming, or cursing in which case the Required Relaxation was given only for 10 min, again explaining to the client that he was overexcited and had to calm himself. The instructor's presence at bedside was usually required only during the first 1 or 2 days until the client learned to lay fairly still with the arms extended. Thereafter, the instructor usually remained with the client for only about 5 min until he was assured that the client was resting in the correct posture. The instructor, or any other staff member passing by the open door, could determine whether the client was resting as required. The pressure-sensitive device attached to the leg of the bed, and described previously (Webster and Azrin, 1973), sounded a signal to the staff if the client left the bed.

Hand Control

The Hand Control Procedure was very similar to the arm exercises described in the previous report (Azrin *et al.*, 1973) for eliminating hand autisms. In the previous report, when the client exhibited an autism he was immediately reprimanded and told that he must now practice holding his hands away from his body. The instructor stood behind him and guided him. The client was required to hold his arms extended at his sides, then outstretched horizontally to the front, then to the side, then extended over his head. Thirty seconds was required in each position preceded by a verbal instruction prior to each change in position. This cycle was repeated for 20 min in the standing posture. No conversation occurred between the instructor and the client, except the instruction every 30 sec as to the change in hand posture. The client received no praise or cajoling from the instructor during the exercises.

Several modifications were made in the above procedure to make it suitable for use with self-injurious clients. The arms-forward position was eliminated since a head-striking movement could be made easily from that position leaving only the arms down, side, and up position. Secondly, the arm-down position was modified to include clasping of the hands together behind one's back in order to make the response more incompatible with striking oneself than was the hands-by-side position. This clasping of the hands also seemed easier to teach and seemed to be used spontaneously after training by the clients as a method of self control. Another modification was to require a position change every 10 sec rather than every 30 sec in order to have the client more active and to give more opportunity to react to the instructions. A fourth modification was to conduct the exercises in the sitting posture rather than standing for those clients who were physically unable to stand easily or who became too fatigued or emotionally upset by having to stand. A fifth modification was omission of the head-orientation exercises at the start of the practice period since the self-injurious clients could easily hit themselves while the instructor was manually guiding their head. A sixth modification was to terminate the arm exercise period while the client was in the arms-down position since this posture merged more naturally with his usual posture. This last posture was maintained for a longer period, 30 sec to 1 min, until the client was standing calmly with his arms down with no need for the instructor to hold his arm there. As in the previous report, the clients usually learned after 1 or

2 days to move their arms to the new position upon hearing the verbal instruction with a need for only minimal manual guidance.

In the event that the client became very upset during the Hand Control exercises, the instructor attempted to continue but paying special note to the need for gentleness of contact during the Graduated Guidance. If the agitation still persisted, the client was seated in a chair and the practice continued. In the event the agitation still persisted, the client was given the Required Relaxation procedure in his bed for a few minutes, until he was calm, at which time he completed the remainder of the 20-min practice period. The general rule was that the client should learn that the full 20 min of practice would be required whenever he injured himself.

Hand-Awareness Training

The Hand-Awareness Training procedure of Azrin and Nunn (1973) was modified for use with the present type of clients. At the start of treatment the instructor continually made comments to the client regarding the need to position his hands away from his head. The instructor used gestures, pointing, and touching as well as verbal statements. When the hands were away from the client's head, the instructor praised him for keeping them there. Conversely, when his hand moved upward for any reason, the instructor directed him to lower them. To maintain awareness of their hands, the clients were instructed to walk with their hands clasped behind their back and to clasp the armrests of their chairs while seated. As in the other procedures, the reinforcers were snack treats, praise, and stroking. As the client learned to maintain his hands away from his head, the instructor commented on the client's hand position progressively less often, but after having commented almost continuously for the first 2 days. This awareness was also being taught indirectly as an integral part of the Hand Control procedure when the client changed his hand position every 10 sec in response to the direct instruction regarding his hands. Similarly, in the Positive Reinforcement procedure, the client was being reinforced for using his hands in a functional manner.

Sequence

At the start of treatment, the protective helmet or mittens were removed and the client was given the Hand-Awareness training, and the Positive Reinforcement for outward-directed activities. When the client injured himself, the instructor immediately reprimanded him in a stern tone of voice that conveyed his displeasure and gave the Hand Control Procedure for 20 min or the Required Relaxation procedure for 2 hr. (See Results section as to which clients received which procedure.) The Positive Reinforcement for outgoing behaviors and the hand-awareness training were then reinstated after indicating to the client that he should not injure himself and that the Hand Control or Required Relaxation would be needed if he did injure himself. Initially, all instruction was conducted in special locations on the ward to obtain a more distraction-free atmosphere. After a few trials the locations were varied so that the client would learn that the procedure would eventually be applied in any locations in which he might self-injure.

Fading out of treatment

In both the Required Relaxation and Hand Control procedures, the instructor 'faded out' the need for his guidance or even his presence. In the Required Relaxation procedure, once the client attained the fixed-posture, and his behavior was agitation-free while in bed,

the instructor moved himself gradually to the rear of the client, and eventually completely out of the client's view. In the Hand Control procedure, once the client was responding to the postural instructions and maintaining the positions unassisted, the instructor reduced his guidance of the client's arms to merely a touch and then to just 'shadowing' the client's movements.

When the client had spent one day without self-injury, the duration of the scheduled Required Relaxation or Hand Control was reduced to about 5 min on the next day, then to 2 min, and then to a simple warning on successive days, providing no self-injurious responses had occurred on the preceding day. Even in the final stage, a warning or reminder was given to the client for any attempt at self-injury.

RESULTS

Figure 1 shows the change in self-injurious conduct averaged for the 11 clients. Each data point is expressed as a percentage of the baseline level. On the first day of training, the self-injurious responses decreased by 90 per cent from the pre-treatment level and decreased further by about 96 per cent by the end of the first week. By the fourth week of training, the self-injurious responses had decreased by 98 per cent and by 99 per cent by the third month. A *t*-test of differences showed that all of the data points were significantly less than the baseline level ($p < 0.001$). (Four clients received no treatment by the ward staff after the special instructors were absent. The data for these 4 clients are therefore included only up to the date that treatment was terminated.)

The Relaxation Procedure was used as the treatment for the first 6 clients. For 3 of these clients, the Relaxation Procedure was very effective, but none of the other 3 clients was benefitted substantially and 2 of them began injuring themselves in a seemingly deliberate fashion in order to obtain the bed-rest indicating that the bed-rest involved in the procedure was serving as a reinforcer for self-injury. In addition, these 3 clients continued to attempt to injure themselves while in bed unless very closely supervised. Consequently, the Relaxation Procedure was discontinued for these 3 clients and the Hand Control procedure substituted for it. The last 5 clients were given only the Hand Control procedure and no Relaxation Training. The data treatment points in Fig. 1 are for the Hand Control procedure for all but the first 3 clients whose data points are for the Relaxation Procedure.

Analysis of the individual benefits showed that 4 of the 11 clients were almost totally free of the self-injurious responses, either having no further self-injurious responses or less than one per week. One of these was discharged to a shelter-care facility where the operators reported he has not exhibited any self-injury. Each of the other 7 clients averaged less than 4 self-injurious responses per day by the second week of treatment. The client who had exhibited self-injurious behavior for the longest period, 31 yr, had the highest level of self-injury after 2 weeks, an average of four self-injurious responses per day. The client who had exhibited self-injurious responses shortly after birth, and a high pre-treatment rate of 3500 responses per day, exhibited an average of only one self-injurious response per week after 2 months of treatment.

Three of the clients often physically aggressed against other residents or staff members at the same time that they exhibited self-injury. The physical aggression by all 3 clients decreased substantially once treatment was initiated for the self-injury.

General improvements in the clients' overall manner were evident when the self-injurious behavior was decreased. Ten of the 11 clients seemed to greatly increase their social interactions and social responsiveness. The notable exception was one client located on

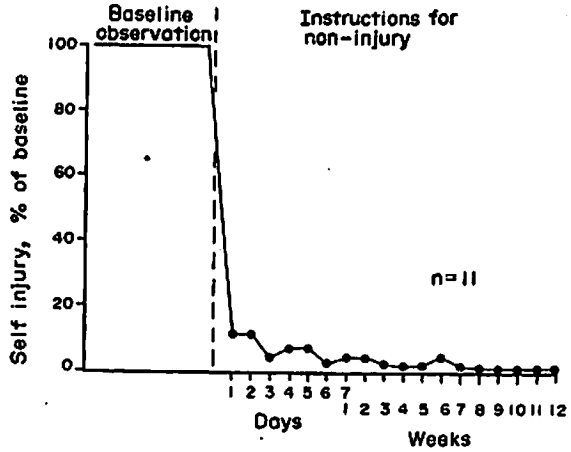

Fig. 1. Self-injurious behavior of 10 retarded and 1 schizophrenic persons. The frequency of self-injury is expressed as a percentage of the frequency recorded prior to treatment. The self-injury prior to treatment (Baseline Observation) was recorded for varying durations dictated by the safety of the client and the frequency of the behavior. The data points are for the average number per day for the first 7 days and weekly thereafter. Each data point is for 11 clients for the first 2 weeks, 9 clients for the 3rd week, 8 for the 4th to 7th weeks and 7 clients thereafter. During the 'Baseline Observation', the self-injury was simply recorded; during the 'Interruptions for Non-Injury', the instructors used positive reinforcement for non-injurious behavior, a Required Relaxation procedure for agitated states, a Hand Control procedure for self-injury and a Hand-Awareness procedure. The vertical dashed line designates the time that the treatment procedure started.

a ward with virtually no programmed activities and whose pre-treatment routine was to sit limply in a chair or to lie in a corner asleep wearing his protective helmet. He exhibited little muscle tone when the instructor manually guided him during attempts at reinforcement during the treatment phase.

DISCUSSION

The new procedure was effective in eliminating, or greatly reducing, the self-injurious behavior of the mentally ill and retarded clients. The treatment was fairly rapid as seen by the average reduction of about 90 per cent on the first day and about 96 per cent by the seventh day. The treatment appears applicable to the general population of self-injurious clients as seen by its effectiveness with all 11 clients in the present unselected sample. The extent of the benefit was substantial in that after three months of treatment, the self-injurious behavior was reduced by an average of 99 per cent. Self-injury was virtually eliminated for all 4 clients. The general acceptability of the treatment was evidenced by the positive reaction of the clinical personnel in all five institutions in which the clients were treated.

Speculatively, the degree of benefit for a given client seemed to be greater if he had a pre-existing high level of outward-directed behavior, or if the ward environment strongly encouraged outward-directed activity. All 4 of the clients who were virtually 'cured' had considerable social and attention-getting behavior, including aggression toward others by three of them, whereas the clients who benefitted less, were seemingly oblivious to the presence or actions of others. The 'custodial' type of wards in which little attention was paid to residents often abandoned the treatment effort, whereas the clients in the treatment-oriented ward situations continued to receive the instruction and continued to benefit. The

Required Relaxation procedure seemed most appropriate for the outward-directed client whereas the Hand Control procedure seemed more appropriate with the inward-directed client. The 3 clients with whom the Required Relaxation was successful were all of the outward-directed type, whereas the 3 clients with whom it was unsuccessful were inward-directed.

Comparison of the present procedure with alternative procedures must be somewhat tentative since the clients treated in the previous reports are of unknown comparability. Nevertheless, the present method appears to be more acceptable as a treatment than either shock or timeout seclusion, in that no physical punishment is used and the emphasis is on instruction and adding reinforcers. In all of the institutions included in this study, shock was viewed as a last resort and the staff were apprehensive about its abuse. They were eager to use this procedure before considering shock punishment. With respect to the speed of treatment, the present method appears at least as rapid as has been reported for the alternative methods but far less rapid than the almost instantaneous benefit obtained in most reports of shock (Bucher and Lovaas, 1968; Corte *et al.*, 1971; Tate and Baroff, 1966; Risley, 1968). With respect to general applicability to a variety of clients, the present method would be considered superior at this time if only because the previous reports have been case studies that have not as yet reported results for a large number of unselected clients. In general, the present method seems to provide many advantages over the alternative methods.

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