CHAPTER III

REVIEW OF RELATED LITERATURE
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This chapter throws light on the effectiveness of various behaviour modification techniques with regard to aggression and other behaviour problems. Other behaviour problems included here are problems of sleeping, eating, elimination, hyperactivity, classroom disruptions, socially withdrawn behaviour, non-compliant behaviour, temper tantrums, delinquent related behaviour, and stereotyped behaviours (repetitive movements). The literature surveyed has been classified under the four major behaviour modification procedures of (1) reinforcement, (2) extinction, (3) punishment and (4) combined. Comparison of these methods has also been done at the end of the chapter.

First three procedures are further sub-divided into two categories such as, effectiveness of reinforcement procedures (DHC, DRI, DRC, and DRL) on (i) aggression, and (ii) other behaviour problems etc. Pictorial form of the classification of review of related literature is represented in Figure 3.1.
Figure 3.1: Various behaviour modification techniques

Behaviour Modification Techniques

Reinforcement | Extinction | Punishment | Combination of methods

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Codes Used:

- DRC - Differential reinforcement of compatible behaviour
- DRI - Differential reinforcement of incompatible behaviour
- DRO - Differential reinforcement of other behaviour
- DRL - Differential reinforcement of low rates of behaviour
- A3  - Aggressive behaviour
- C3P - Other behaviour problems
- TO  - Time out
- RC  - Response cost
- AS  - Aversive stimulation
- CC  - Over correction

Comparison of methods:

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- Posi. - Positive
- Rein. - Reinforcement
- Neg. - Negative
- Pun. - Punishment
- Diff. Rein. - Differential reinforcement
- Ext. - Extinction

* Since sufficient studies are not available with regard to combination of methods and comparison of methods, aggression and other behaviour problems are not presented separately.
REINFORCEMENT PROCEDURES

A variety of reinforcement techniques (e.g., DRC, DRI, DRO, and DRL) have been used to reduce or eliminate aggression and other behaviour problems.

Effect of Differential Reinforcement of Compatible Behaviour (DRC) on Aggression

Only a few studies have demonstrated successful results with DRC in reducing aggression when the procedure was not combined with other methods. Lovaas et al. (1965a) reinforced a nine-year old schizophrenic child for hand clapping with the music with smiles and praises who exhibited a high rate of self-injurious behaviour. Self-hitting decreased to a near zero level of occurrence when the compatible behaviour was rewarded and increased dramatically when hand clapping was no longer reinforced. Similarly, the same subject demonstrated a decrease in self-injury from approximately 21 self-injurious acts per session to approximately 6 per session when socially reinforced for bar pressing.

Schneider et al. (1979) trained a self-injurious subject to sit on command. They were able to reduce head banging, eye gouging, and cutting or burning the skin by issuing the command early in chains of tantrum behaviours, that otherwise would normally culminate in severe self-injurious behaviour.

Gavino et al. (1985) described an intervention programme used in a forth form public school class with aggressive, hostile children who came from an urban setting and had a low
socio-economic status. Subjects consisted of eleven boys between ten and twelve years old. Subjects were given academic material on their own level, and a system of points was established in two phases. The first phase (4-weeks) focused on assistance in class, personal cleanliness and language use. In the second phase (4-weeks) three types of behaviours as goals were selected for each subject. In both phases, reinforcements for points were devised. The results of two months of treatment showed positive improvement. Aggression and school absence of the subjects decreased.

On the other hand, Young and Wincze (1974) were not successful in reducing head to object and fist to head injurious behaviour through reinforcement of eye contact. Only reinforcement of specific incompatible responses reduced specific self-injurious behaviours.

**Effect of DRC on Other Behaviour Problems**

Fawell (1973) reported to have reduced unspecified stereotypic behaviours (repetitive movements) when performance on a pegboard task was reinforced. The investigator did not come across any other study in the area.

**Effect of Differential Reinforcement of Incompatible Behaviour (DRI) on Aggression**

Reinforcement of incompatible behaviours was successful in an experiment by Peterson and Peterson (1968). The partial
elimination of behaviours such as hitting the hand against teeth, head banging and head slapping were achieved in an elaborate system using primarily the reinforcing of incompatible behaviours.

Tarpley and Schroeder (1979) were successful in reducing hand to head and face and other self-injurious behaviours in three subjects by reinforcing of both holding the ball and passing it to the trainer.

Tierney (1986) reported that the frequency and intensity of a 14-year old profoundly retarded male's self-injurious behaviour was significantly reduced by the reinforcement of calm sitting behaviour. Social validation ratings confirmed the effectiveness of treatment and showed that gains were generalized across treatment and non-treatment settings and across people associated with treatment.

Effect of Differential Reinforcement of Incompatible Behaviour (DRI) On Other Behaviour Problems

Hart et al. (1968) reinforced an uncooperative young girl for various categories of cooperative play with other children. There were five phases in the study: (i) The teachers first measured her rate of cooperative behaviour for 10 days and found it stable, occurring on the average of 3 per cent of the time. (ii) They then applied frequent social reinforcement in a non-contingent manner for 7 days, and noted no change in her typical rate of cooperative play. (iii) Subsequently, much less social reinforcement was applied but contingent
on instances of cooperative play and in 12 days produced a markedly higher average rate of cooperation, reaching an average rate of cooperation of approximately 20 per cent during the last six days of this reinforcement. (iv) -hen contingent reinforcement was briefly discontinued by reinstating the condition of frequent non-contingent reinforcement which had previously failed to produce any change in the cooperative play. The non-contingent reinforcement did not support the high rate of cooperation just built up by contingent reinforcement. Finally, resumption of less frequent but contingent reinforcement immediately recovered a suitably high rate of cooperative play in the child.

Brawley et al. (1969) employed a combination of food and singing as reinforcing events to reduce the frequency of tantrums and "junk" verbalizations, such as hissing and spitting, of a retarded autistic child who was in a language training programme. The reinforcers were made contingent upon attention to and imitation of the experimenter. Inappropriate verbalizations decreased from 10 per cent during baseline to less than 1 per cent during conditioning. Tantrum behaviour which occurred during 3 per cent of the baseline was eliminated by this procedure. Nordquist and Wahler (1973) also reported similar results.

Twardosz and Sajwaj (1972) used differential reinforcement of incompatible behaviour (DRI) for being seated in the chair,
to decrease hyperactivity of a retarded boy in a school setting. The results indicated that DRI (reinforcement for sitting calm) decelerated the incompatible hyperactive behaviour, at least while the contingencies were in effect. Baker, Stanish, and Fraser (1972), and Hislop, Moore, and Stanish (1973) used a similar procedure successfully.

Winett and Roach (1973) modified a variety of disruptive classroom behaviours of 10 mildly retarded children by reinforcing completion of academic work with free time. The procedure both reduced disruptions and increased academic productivity.

Carr et al. (1975) used differential reinforcement successfully for correctly responding to the trainer's commands and questions to reduce echolalic behaviour of the three Ss by repeating the command or question instead of responding appropriately. In these studies, the response reinforced was physically incompatible with the target behaviour.

Mulick et al. (1981) successfully used this technique (DRI) to reduce the subject's regurgitation (self-induced vomiting). In this study, toy-play responses were reinforced only when unaccompanied by regurgitation.

Negative results with DRI have also been reported in a few studies. Risley (1968) found reinforcement for sitting and eye contact to be ineffective in reducing a dangerous
behaviour which involved climbing a furniture, a door frame, and a high ventilator in an experimental room.

Martin et al. (1972) found that social reinforcement for appropriate eating behaviour failed to reduce "slopping" of three severely retarded girls.

Effect of Differential Reinforcement of Other Behaviour (DRO) on Aggression

Allen and Harris (1966) made use of DRO in the successful treatment of a young child who was mutilating herself by continual scratching. Face and neck as well as other parts of her body were covered with sores and scars from almost a year of scratching. Her mother was trained to withhold all reinforcement contingent upon the child's scratching herself but to reinforce all other behaviours. As scratching decreased, the mother was instructed in appropriate techniques for thinning out the reinforcement schedule. At the end of six weeks, the child's face and body were clear of all scabs and sores. Four months later, scratching behaviour had not occurred.

Repp, et al. (1976) successfully suppressed hair twirling, hand biting, thumb-sucking, and classroom talking behaviours with DRO. Also, reduction in self-injurious behaviour with DRO was reported by Ragain and Anson (1976).

On the other hand, increases in aberrant responding (yelling, running, throwing objects, pinching etc.) under DRO conditions were noted in two of the five subjects in a report by Foxx and Shapiro (1973).
Effect of DRO on Other Behaviour Problems

Patterson, et al. (1965) reported a study in which treatment of hyperactive children led to decrease of non-attending behaviours as arm and leg movements, shuffling a chair, looking out of window, fiddling, talking to self, and wiggling of feet. The treatment method called for the delivery of candy contingent on the non-occurrence of non-attending behaviour - a method known as DRO.

Repp et al. (1974) applied social reinforcement to reduce body rocking in one subject, hand movements in second, and lip flapping (vertical movement of fingers across lips) in the third subject. These stereotyped behaviours were successfully reduced using a DRO procedure.

Luiselli et al. (1981) used treats for 'good sitting' and for 'good talking' with their two subjects. They also used the principle of extending DRO time interval as the behaviour of their subjects improved. The criteria for reward for not vocalizing irrelevantly was being extended from one minute to six minutes during treatment. They reported generalization of improved behaviour to other, untreated responses, by one of their subjects. However, failure to find generalization across settings and responses has been highlighted by some authors (Homer and Peterson, 1980).

Christensen and Sanders (1987) observed the behaviour of 30 children (aged 4-9 years) who sucked their thumbs or
fingers excessively. Subjects were assigned randomly to habit-reversal (HAR), a differential reinforcement of other behaviour (DRO), and a wait list control group. Results indicated that both procedures effectively reduced thumb sucking in a training setting as well as in two generalization settings and their initial generalization effects were maintained overtime. However, both procedures resulted in some temporary increases in opposition behaviours and produced low elimination rates.

Effect of Differential Reinforcement of Low-Rate Behaviour (DRL) on Aggression

The use of DRL to reduce aggressive behaviour has been uncommon. To the best of the knowledge of the investigator no study has been reported so far with regard to the use of DRL to reduce aggression.

Effect of DRL on Other Behaviour Problems

Hollis (1978) found DRL effective for reducing a retarded subject's stereotyped rocking behaviour. Similar results were obtained with the head and face touching of an adult psychiatric patient in a study reported by Corroccio and his co-workers (1976).

In an experimental laboratory study, Mulhern and Baumeister (1969) reduced body-rocking in two severe retardates by programming food reinforcement contingent upon a reduction
in rate of rocking for a prescribed period of time. Relative to the base rate of approximately 60 responses per minute, each of the subjects demonstrated a gradual, albeit moderate reduction of the rate of body rocking.

Singh et al. (1981b) rewarded stereotyped responses in three individuals with success but only if, initially, they had not made the response for 12 seconds. This interval was then extended to 30, 60, and 80 seconds. The behaviour occurring at these increasingly low rates and being replaced by increased social behaviour such as smiling and communicating was rewarded.

McLaughlin et al. (1986) examined the effects of reducing the number of daily home work question contingent upon low rates of inappropriate classroom behaviour (DHL). Nineteen special education middle school students with learning disabilities, behavioural disorders, or mild mental retardation were assessed in terms of appropriate social behaviour assignment completion, and academic accuracy. The intervention was evaluated in a multiple baseline design across two teachers. Results indicated differential teacher effects on the total frequency of inappropriate behaviours. Reducing the number of questions required for home work for decreasing levels of inappropriate social behaviour generated low levels of such responding for both teachers. No systematic changes in either home work accuracy or completion were found.
EXTINCTION

Effect of Extinction on Aggression

Use of extinction for self-injurious responding has been reported by Bucher and Lovaas (1968). They reduced self-injurious behaviour responses during 1.5 hour sessions from 3000 to 15 by leaving a child unrestrained in his crib and ignoring all occurrences of the target behaviour. Similarly, Lovaas and Simmons (1969) reduced the self-injurious behaviour of the two subjects by non-contingently isolating each in a small experimental room. Allen et al. (1970) have also achieved success in reducing aggression.

Pinkston (1973) instructed a nursery school teacher to introduce withdrawal of attention from a child contingent on an aggressive response, ignoring a child's aggressive behaviour as much as possible and attending instead to the child who had attacked. It was reported that the child's aggressive behaviour declined and socially desirable behaviour increased, especially when the teacher attended to him, when he engaged in non-aggressive interaction with other children.

Martin and Foxx (1973) illustrated extinction of aggressive behaviour in a mentally retarded twenty-two year old woman. A staff member acted as a victim of the attacks and tried to ignore all aggressive acts, which eventually extinguished.

Jones et al. (1974) reported successful results with a self-injurious girl using isolation with 2-hour sessions
twice daily. A somewhat surprising outcome was that generalization of suppression to other periods of the day was achieved without having systematically programmed for such generalization.

Wise (1975) using extinction procedures to reduce head banging episodes, reported positive results after only 25 days. A two-and-half year follow-up indicated total cessation of head banging with no symptom substitute.

Carr et al. (1980) also treated aggressive behaviour. Their first study showed that attacks on the experimenter occurred only when demands were placed on the two children studied. They found that attacks were reduced in frequency when the experimenter signalled the children that demands were to be ceased. Carr et al. (1980) concluded that aggressive responses were being negatively reinforced because they led to the children being allowed to escape from demand situations. Their approach to modify this behaviour was, first of all, to substitute a non-aggressive response, tapping for aggressive behaviour, both being reinforced by allowing escape. Rates of the two behaviours, however, were so high that it was necessary to extinguish escape responding by preventing the child concerned from leaving the demand situation. At the beginning of extinction, rates were high (500 or more responses per hour) but fell to one or two acts per hour-long session after five hours of treatment. Rates jumped to 1625 aggressive acts when they were again negatively reinforced but fell to near zero when extinction was reintroduced.
Others have found extinction less effective for suppressing self-injurious behaviour. Ignoring target responses in a classroom situation proved to be ineffective according to Myers (1975). Similar negative results were reported by Corte et al. (1971), who attempted to reduce the self-injury of two subjects using non-contingent isolation. Other investigators who have reported limited or negative results include Lovaas et al. (1965a), Simmons and Lovaas (1969), and Wolf et al. (1967). Even in the positive cases described above, thousands of unconsequented responses often occurred before the self-injury was significantly reduced.

**Effect of Extinction on Other Behaviour Problems**

Extinction has been employed to reduce a variety of aberrant behaviours. In an early study, Ayllon and Michael (1959) reduced frequent and unnecessary visits to the nurse's office by instructing staff to ignore the individual during such visits.

In a study, Hart et al. (1964) used extinction in concern with excessive crying in two pre-school children. In one case, the teachers simply discontinued attending to boy when he cried, after observing a ten day baseline during which crying occurred about five to ten times per session. In the course of ten days of extinction, his crying rate declined. Attending to crying was then resumed, and crying recovered its previous high rate. It was, then, of course, extinguished.
once again with good success. The second case proceeded similarly but the recovery of crying was not so clear-cut when crying was again attended to after initial extinction. The study ended with low crying rates in both cases.

Allen and his associates (1970) reported that prior to extinction, the classroom tantrums of a four-and-a-half year old boy lasted an average of about five minutes each. The first tantrum that occurred after the teacher began ignoring this behaviour was more severe than previous ones and lasted twenty seven minutes. The next day only one tantrum occurred. It lasted fifteen minutes. After that there was no further tantrum.

In a study by Laws et al. (1971), ignoring was contingent upon hand movements and head bobbing with two retarded children. A steady reduction in the frequency of the repetitious movements was seen over sessions. When a reversal condition (social approval for stereotypy) was introduced for one of the subjects, the stereotypy immediately increased. Others have achieved success in reducing spitting (Forehand, 1973), and destruction of property (Martin and Foxx, 1973).

Martin and Iagulli (1974) used ignoring procedure to decrease bed time tantrums of a severely retarded institutionalized female. Simply ignoring tantrums failed to achieve deceleration. A procedure was introduced which combined keeping the child awake until midnight while ignoring any tantrums which occurred after that time. This procedure reduced the behaviour
to a near zero level and no further tantrums were observed.

**PUNISHMENT PROCEDURES**

Over correction, time out and response cost are mainly used as punishment procedures to reduce inappropriate behaviour. Shock or aversive stimulation has also been used by many researchers to reduce aggression as well as other aberrant behaviours.

**Effect of Over Correction on Aggression**

Foxx and Azrin (1973) have reported that "overcorrection procedures reduced self-stimulation substantially on the first day and to a zero level by the end of ten days and sometimes sooner". They also found the reduction more rapid, complete, and long lasting than that achieved by other separately applied reductive procedures like time out, disapproval or slaps and reinforcement of competing behaviour when used on aggressive-disruptive (1972) and self-stimulating behaviours (1973).

Required relaxation, a form of positive practice overcorrection directed at the general state of agitation rather than at a specific target behaviour, was used by Webster and Azrin (1973) to reduce such behaviours as aggression, destruction of property, self-injury and clothes stripping.

Barnard and colleagues (1974) tried an over correction procedure on head banging behaviour of three children aged...
48, 36 and 18 months. The older children's head banging resulted in bruises, bumps, and lacerations. The oldest had even fractured his skull. The youngest, on the other hand had never injured himself. An attempt was made to have each child engaged in the following over correction procedure after each occurrence of head banging: application of an ice pack to the head for three minutes, washing the pumped area for two minutes, drying his head for one minute, and combing and brushing his hair for one minute. Head banging was rapidly reduced in the two older children but not in the youngest. Perhaps he was too young to engage in the procedure. In any event, the authors noted, "this new treatment procedure for head-banging seems very effective for some children, but probably warrants further exploration" (1974).

Positive practice over concentration showed positive effects on reduction of self-injurious behaviour (de Cantanzaro and Baldwin, 1978; Harris and Romaczyk, 1976; Matson et al., 1978; Zehr and Theobald, 1978).

Effect of Over correction on Other Behaviour Problems

The clients who frequently bite their hands in a study by Barnard and colleagues (1974) were required to engage in two minutes of washing the affected areas, using a cotton swab and mild soap; one minute of hand drying; and two minutes of rubbing hand cream into the affected area. Biting hands was substantially reduced among all children in the study.
Stereotypic behaviour had been reduced with positive practice over correction by many investigators (Deno et al., 1977; Epstein et al., 1974; Harris and Wolehick, 1979; Roberts et al., 1979; Rollings et al., 1977; Zehr and Theobald, 1978; and Matson and Stephens, 1979).

Positive practice over correction has also shown a wide variety of side effects. Epstein (1974) found an increase in appropriate toy play, but also an increase in unwanted behaviours (vocalization) after suppression of self-stimulation. Rollings et al. (1977) reported increases in a variety of unacceptable behaviours such as self-hitting, self-pinching, screaming, and self-scratching in two subjects being over corrected for body rocking and head weaving.

Carey and Bucher (1983) stated that incidents of aggression and disruptive behaviour occurred under a three minute treatment duration, but not under a thirty-second duration. Doyle and Epstein (1975) found that positive practice overcorrection suppressed stereotypic behaviour but that threats of over correction led to an increase in rocking, noise-making, face slapping, and masturbation. Wells et al. (1976) indicated mixed effects for different subjects and concluded that patterns of response co-variation may be highly idiosyncratic.

**Effect of Time out on Aggression**

Time out procedures have been used successfully to reduce
aggressive behaviour by many investigators. In a study, Hops and Walters (1963) investigated the effects of emotional arousal by experimentally manipulating isolation and anxiety in first and second grade public school children before placing them in the aggression reinforcement situation. A 2 x 2 factorial design was utilized in which isolation was manipulated by having children wait alone or on the playground for a 20-minute period before the experiment, and anxiety was varied by the experimenter acting in either a cold and bruesque or friendly manner. Neither of these variables produced any effects in the second grade children possibly because the experimental manipulations were less threatening for them as compared to the first graders. For the first graders, anxiety condition resulted in a higher response rate during reinforcement and both anxiety and isolation produced greater resistance to extinction.

Wolf et al. (1964) reported a case of Dickey. He was three and a half year old. He engaged in self-destructive behaviours such as head banging, hair pulling, and face slapping and scratching. The therapists first attacked the boys refusal to wear his eye glasses and his throwing of his eye glasses because that seemed the most serious, immediate problem. Wearing of glasses was gradually established by reinforcement. A mild form of punishment was made contingent on throwing of glasses. Following each throw of glasses
the boy was put in his room for ten minutes, a form of time out from positive reinforcement. Throwing of glasses had taken place at the rate of approximately two times per day before treatment was initiated. Within five days of treatment, i.e., instituting the time out procedure, the rate of this behaviour had decreased to zero but when he was no longer put in his room for throwing the glasses, thus reversing the contingencies, the rate of throwing of glasses returned to the original level after about three weeks. When he was once again put in time out room whenever this behaviour occurred, it quickly decreased in frequency and virtually disappeared within six days.

Wolf et al. (1964) again conducted a study on the same autistic retarded child who engaged in head banging and face slapping. Each occurrence of these target behaviours was followed by isolating the child in his room in the hospital until the behaviour terminated. Subsequently, the same child was observed by Wolf et al. (1967) to engage in face slapping in a pre-school programme. Again isolation was imposed on the child contingent upon face slapping. The duration of the time out was about 30 minutes. Whereas approximately 100 occasions of isolation were required to eliminate the behaviour in the hospital setting, only three were necessary in the pre-school setting. Thus, the finding suggests that prior exposure to the isolation contingency facilitated the effectiveness of the procedure in a different setting.
Hamilton et al. (1967) decelerated high rate of head banging in a severely retarded institutionalized female by placing her in isolation for 30 minutes contingent upon each occurrence of the behaviour. A decrease from a baseline of approximately 20 responses per minute to a total elimination of the target behaviour was observed. Over a five month interval, the behaviour did not reappear. Furthermore, concomitant with the elimination of the target behaviour, the child was reported to interact more effectively with her environment.

Tyler and Brown (1967) reported the successful time out programme with a group of institutionalized delinquent boys (aged 13-15 years) whose disruptive behaviour in the cottage reaction room was of serious concern to the staff. After deciding on target behaviours (aggression, e.g., throwing or hitting with a pool cue, fighting around the pool table, breaking the rules of the game etc.) the investigators initiated a procedure wherein misbehaviour resulted in isolation in a time-out room for fifteen minutes. The 4x8 feet isolation room was constructed in one corner of the cottage, permitting rapid removal and return of each youngster. Misbehaviour declined under the time out contingency, increased during reinstatement of original conditions, and declined once again with reintroduction of time out.

Contingent observation and trainer withdrawal (time out) have been employed successfully for the reduction of self-
injurious or destructive behaviour (Baroff and Tate 1968; Rubin et al., 1972; and Thomas and Howard, 1971). Most of these studies have simply involved temporary withdrawal of trainer attention, but Lucero et al. (1976) achieved greater reduction in self-injurious behaviour during meals when withdrawal of training was accompanied by the temporary removal of the individual's food tray.

Bostow and Bailey (1969) successfully applied time out of two minutes' duration (plus an additional fifteen seconds of quiet behaviour at the end of that time) for disruptive and aggressive behaviours of retarded patients in a State hospital ward setting.

Husted et al. (1971) reported that aggressive and self-destructive behaviours were successfully controlled by time out in training sessions where there was a high level of reward for acceptable behaviours. However, time out was ineffective when the individuals were returned to ward situations in which the level of positive interaction was low.

Pendergrass (1971) compared a relative effectiveness of 5 and 20 minutes time out durations contingent upon the hitting behaviour of a retarded female. Isolation periods of either duration eliminated hitting when the time out was imposed in every session. However, when imposed in every other session, neither isolation period resulted in a significant decrease in the target behaviour.
In contrast, Burchard and Berrara (1972) found that with mildly retarded institutionalized males, a 30-minute period time out was more effective in reducing anti-social behaviours such as fighting, swearing, and property destruction than a 5-minute isolation period.

White et al. (1972) exposed each of 20 moderately and severely retarded institutionalized children to 1, 15, and 30 minutes of isolation in a design which was counterbalanced for order presentation of each time out length. A baseline was interposed between each isolation treatment condition. Two anti-social responses, aggression and tantrum, as well as self-destructive acts were the primary target behaviours. Not considering the length of the time out period, an analysis comparing baseline and isolation treatment conditions revealed that time out significantly reduced the target behaviours. Furthermore, the results indicated that 15- and 30-minute isolation periods each produced a 35 per cent decrease in the target behaviours. The effects of 1-minute time out period depended upon the sequence in which it was presented. When the 1-minute period preceded longer time out durations, the brief time out decreased anti-social and destructive behaviours. However, when it followed a longer isolation duration, the target behaviours actually increased in rate above the preceding baseline.

Drabman and Spitalnik (1973a) used 'pseudo-time out' procedure to observe the classroom behaviour of five children
every day of the week during an entire 55-minute period. Three forms of disruptive behaviour had been targeted: out of seat, aggression, and not permitted vocalization. The first two of these behaviours were subjected to intervention while vocalization served as a control in a multiple baseline design. Treatment consisted of response-contingent social isolation that took the following form: As soon as one of the target behaviours had reached the pre-determined criterion, the observer would give an unobstructive signal whereupon the teacher would instruct a teaching assistant to take the child out of the class, address the child and say, 'you have misbehaved. You must leave the class'. The teaching assistant would then immediately escort the child to a small empty, dimly lit, sound resistant music practice room in which the child had to remain for 10 minutes. Isolation was terminated on a fixed basis, regardless of what the child was doing at that time. The results demonstrated that the use of contingent social isolation was effective in reducing the frequency of behaviour that had thus been punished. During the first baseline phase which lasted for 11 days, the mean percentage of out-of-seat behaviour for the five children was 34%. During the 16 days that contingent social isolation was in effect this behaviour was significantly reduced to a frequency of 11 per cent. When the contingency was removed during the second baseline phase, lasting 10 days, the mean frequency of this behaviour increased to 15 per cent which was significantly
Aggression had a mean frequency of 2.8 per cent during the first baseline phase. It fell to .37 per cent while social isolation was in effect, and remained at .40 per cent when intervention was ceased. For both of these phases the reduction in frequency below the first baseline was statistically significant. For the third observed disruptive behaviour in which vocalization had not been punished, the mean frequencies remained relatively unchanged throughout.

In a study with moderately retarded female enrolled in a day care centre, Calhoun and Matherene (1974) devised an isolation procedure for aggressive behaviour (hitting, kicking, and spitting). Following an initial baseline, the subject was placed in a time out room for every fifth aggressive response. Subsequently, a second baseline was taken and a second treatment procedure was initiated in which every other aggressive act resulted in isolation. A final baseline was followed by the application of time out contingent upon every occurrence of aggression. Isolation consisted of placing the child in a small room until she was quiet for two minutes period. The results indicated that placing the subject in a time out room for every fifth aggressive response failed to affect the aggression. However, time out delivered for every other response significantly decreased the target behaviour. Furthermore, the reduction was maintained at the time of a 5-week follow-up.
The relationship between aggressive content of speech and physical aggression had been reported by Firestone (1976) in a study of behaviour of a four and a half year old boy who had been expelled from nursery school the previous year for his aggressive behaviour. He was about to be expelled again for the same reason. Firestone was interested in studying whether a time out approach procedure had any undesirable effect as had been reported by Pendergrass (1972) who had found the social responses of two retarded children to decrease when their aggressive behaviour was treated by time out approach. For this reason Firestone (1976) gathered direct observations not only of verbal and physical aggression but also of cooperative behaviour, interaction with teachers, and isolated play. After three days of baseline observations the time out procedure was instituted contingent upon acts of physical aggression which had been defined as striking, hitting, kicking, pulling, and destroying others' property. Time out consisted of requiring the boy sit in a chair, placed in a corner of the classroom, until he had been quiet for two minutes.

During baseline, the child's physical aggression took up about 20 per cent of the daily observation periods which lasted approximately 2 hours. When the time out procedure was instituted on a fourth day, during which the child had to be placed in a time out chair six times, the rate of aggressive acts dropped precipitously to a 4 per cent level. This rate then continued to decline over the next 9 days,
reaching an average of 1.9 per cent. Concurrently, incidents of verbal aggression, which had not been placed on the time out contingency and had been at a 3.7 per cent level during baseline, dropped to 0.53 per cent of the observed time by the fifth day of the time out phase. It was found that neither the boy’s general activity level nor his cooperative play were adversely affected by the time out procedure. In fact, his cooperative play showed a marked increase from a baseline rate of 42.2 per cent to an average of 68.2 per cent during the 10th day of the treatment phase. Concurrently, his rate of isolated play decreased from 28.2 per cent to 8.2 per cent. These results showed that as this boy’s aggressive behaviour decreased, socially acceptable behaviour that had already been in his repertoire underwent an increase, possibly because greater acceptance by his peers reinforced such activity.

Jackson and Calhoun (1977) found that decreases in whinning, shouting and crying by a ten-year-old mentally handicapped boy followed two minute periods of time out. These decreases in vocal behaviour were accompanied by reduction in hitting and out-of-seat activity, and increases in appropriate social interaction with other children.

Barton et al. (1987) studied the effects of differential schedules of time out by allowing one maladaptive response per interval before time out procedure was implemented. The subjects were three school going mentally retarded children (aged 5-9 years). Subjects' maladaptive behaviours included
chin digging against other persons, attention seeking behaviour and biting others. The study used multiple baseline design and demonstrated that a differential schedule of time out was effective in reducing the target maladaptive behaviours. In addition, by permitting one behaviour to occur within an interval that occasioned only a warning, the subjects were allowed to develop self-control within a structured setting.

**Effect of Time out on Other Behaviour Problems**

A variety of behaviour problems have been reduced using time out procedures. Wolf et al. (1964) were successful in reducing temper tantrums of an autistic child by sending the child to his room contingent upon each occurrence of this behaviour. The child was required to remain in his room until the tantrum behaviour subsided. After two months, a minimum time of 10 minutes in time out was imposed. During the first four months of treatment the frequency with which the child was placed in time out did not change greatly. Eventually, however, the tantrum almost completely disappeared.

Risley and Wolf (1967) were able to eliminate disruptive behaviour by using time out from positive reinforcement. Working on the development of speech in echolalic children, distractability and hyperactivity were found to interfere with the training process. Mildly disruptive behaviours were brought under control by simply looking away until the child once again sat quietly in his chair. More severe forms of
disruptive behaviours were dealt with by having the therapist leave the room for a set period. The room was re-entered only when the child had not engaged in the disruptive behaviour for a short length of time. The therapist's coming back into the room, thus, served as a negative reinforcer for desired behaviour since being alone was an aversive condition for the child, a condition that was being terminated contingent on the behaviour to be reinforced.

Barton and his co-workers (1970) were able to decrease food stealing at meal times in a group of severely and profoundly retarded residents by removing each offender to a seclusion room for the remainder of the meal. Similarly, Smeets (1970) found that a combination of contingent termination of meals and withdrawal of trailer was effective in reducing the regurgitation and rumination of one retarded subject. Martin et al. (1971) also were successful in reducing inappropriate eating and disruptive behaviour of retardates by contingent application of a 15 seconds time out period.

Reports of unsuccessful results with time out have also appeared. Doleys et al. (1976) observed only partial response suppression using time out for a subject's non compliant behaviour. Others have even noted increases in target responses following the use of time out (Frankel et al., 1976).

Plummer et al. (1977) were also unsuccessful in reducing a 5 year old autistic girl's disruptive behaviour during
individualized lessons by using time out from positive reinforcement. The teacher interrupted the lesson and turned away from the girl each time she engaged in disruptive behaviour. This procedure increased the frequency of the disruptive behaviours. Hence, the problem was dealt with by substituting placed instruction for time out on a set time regardless of the child's behaviour.

A similar analysis of the effect of time out was presented by Solnick et al. (1977) in a study that dealt with the tantrum behaviour of a 6 year old autistic girl. This girl occasionally engaged in this high magnitude behaviour during sessions of colour-discrimination training. In an attempt to eliminate these tantrums, time out procedure was instituted in that the teacher would leave the room for 10 seconds, taking along the candy which she was using to reinforce correct responses. Contrary to expectations, this procedure increased the frequency of tantrums to as many as 33 per cent while they had ranged from zero to three per session before time out was instated. Clearly, something in the time out procedure served as a reinforcer. Observations revealed that the girl spent virtually every time out period engaging in self-stimulatory behaviour.

Time out approaches are not without their limitations. Behaviour, such as stereotypy are often to occur during time out, and with self-injurious behaviour, for example, the potential consequences may be quite serious, Harris and
Hershfield (1978) suggest that time out is most suitable for tantrums, aggressive behaviour, or mild behaviour problems. The necessity of removing the client from the learning situation with many types of time out is an important drawback that should be considered (Baumeister and Rollings, 1976; Harris & Hershfield, 1978).

Effect of Response Cost Procedure on Aggression

A few studies have been conducted to reduce aggression by response cost procedure. A contingent response cost (i.e. withdrawal of a reinforcer) was effective in eliminating head banging, and face slapping. Tate and Baroff (1966) initially observed that physical contact was reinforcing to a child who engaged in head banging and face slapping. Self-injurious behaviour by the child was virtually eliminated by the withdrawal of hand holding with the child with 3 seconds contingent upon the self-injurious behaviour.

Burchard and Berrara (1972) used response cost procedure to suppress maladaptive behaviours such as assaults, swearing, and property destruction. They found that more severe costs, a thirty as opposed to a five-token fine suppressed maladaptive aggressive behaviours much more effectively.

Greene and Pratt (1972) used response cost group contingency to reduce aggression (rudeness, obscenity, insult, and disruptions) in 11 special education classes. Each incident
of a targeted behaviour resulted in a 1 minute loss of a 30 minute free time period for the whole class. The procedure resulted in a reduction in misbehaviour of 10 out of 11 classes. The mean daily incidence of misbehaviour per student decreased from approximately 1.4 during baseline to .4 during treatment.

Martin and Foxx (1973) used non contingent withdrawal of social reinforcement from all behaviour during treatment sessions in an effort to decrease aggression towards experimenter (slapping, kicking, pinching, and biting) and towards objects (tearing clothes, throwing beddings). The subject, a moderately retarded female, had been institutionalized following frequent outbursts of aggression. Relative to a condition where the subject received social reinforcement during a session resulted in a marked decrease in both experimenter and object directed aggressions.

Effect of Response cost Procedure on Other Behaviour Problems

A use of response cost procedure was made by Baer (1962a) on three young thumb-suckers, who were engaged in watching moving cartoons. For an experimental application of costs, whenever a child placed his thumb in his mouth, the cartoons were discontinued and whenever the thumb was removed from the mouth the cartoons were resumed. Thumb-sucking was greatly decreased under this condition and recovered when the condition was discontinued, across several replications. Children receiving non contingent withdrawal of cartoons at the same
times when thumb-sucking children had their withdrawal, were unaffected in their thumb-sucking rate. The modification of thumb-sucking was effective only within the laboratory setting, where it took place. No attempt was made to generalize the control of other environments.

Azrin and Holz (1966) found that the more intense was the stimulus, the more effective was the response suppression. The intensity of response cost is represented by the size of the fine.

Sulzbacher and Houser (1968) reduced disruptive behaviours in a class of 14 educable retarded children. Under the response cost contingency the entire class lost 1 minute of a special 10 minute recess whenever any of the targeted behaviours i.e., finger gesturing and/or associated verbal references occurred. This procedure reduced these targeted behaviours from a mean daily baseline frequency of approximately 15 to a treatment mean near zero. A reversal to the baseline condition was associated with an increase in disruptive behaviours to approximately 6 inches daily.

**Effect of Aversive Stimulation on Aggression**

Verbal exclamations, reprimands, slaps, electric shocks, contingent tickling, unpleasant tasting solutions, inhalation of aromatic ammonia, scolding, verbal admonishments etc. have been used as aversive stimulation procedures by many investigators.
Tate and Baroff (1966) reported a case study in which head banging and face slapping were eliminated in a psychotic retarded child by the contingent use of shock. During the initial baseline the target behaviours were occurring at an average of 5 per minute. Subsequently, during the first treatment session, the contingent application of shock decreased the rate of behaviours to .06 per minute. On subsequent days, shock was either administered immediately following the target behaviours or sometimes delayed by 30 seconds. These procedures were followed for 167 days. During the last 20 days there were no incidents of self-injurious behaviour.

After failing to control climbing behaviour by systematic use of reinforcement and time-out procedure, Risley (1968) combined shock and verbal command (the word 'no') to suppress the child climbing in his laboratory and was successful in eliminating this behaviour. Risley (1968) also used shock to control aggressive behaviours of the same child towards younger siblings. Shock decreased the incidence of aggression from 2.3 incidents per day on the first three days of the procedure to zero by the eighteenth day. Suppression was maintained for subsequent 70 days of data recording.

In an examination of generalization of shock across situations, Bucher and King (1971) administered shock to an institutionalized retardate contingent upon his destruction of property. The subject was exposed to 16 experimental situations. The results indicated that shock in any one
situation suppressed the destructive behaviour in that setting. However, exposure to new setting resulted in an increase in the anti-social behaviour. Apparently, the child was able to discriminate experimental conditions.

Electric shocks to reduce self-improving behaviour have also been used by Bachman and Wincze (1975), Ball and Coworkers (1975), Corte et al. (1971), Lovaas and Simmons (1969), Prochaska et al. (1974), and Whaley and Tough (1970). In the last mentioned study the subject was fitted with aluminium foil gloves, and electrodes were attached to his calf. Self hits completed the circuit and automatically delivered contingent shocks. Later, toy holding, incompatible with self-injurious behaviour, was shaped using both avoidance and escape procedures with a special toy which terminated a buzzer sound and shock when held with both hands.

Types of aversive stimuli other than electric shocks and hand slapping have also been reported. Contingent tickling was used by Greene and Hoats (1971) to reduce aggression, destruction of property, and fake seizures. Inhalation of aromatic ammonia delivered by crushing an ammonia capsule and holding it under the subject's nose was introduced as a punishment technique by Tanner and Zeiler (1975) to reduce self-injurious behaviour.

Aversive stimulation is not totally successful in eliminating aggressive acts. Pulling of subject's hair contingent on eye gouging did result in immediate and
pronounced suppression of the self-injury in two of the three subjects in a study of Banks and Locke (1969). However, they observed that response rates would return to near baseline levels by the following day's treatment session. Richmond and Martin (1977) reported the successful reduction in the aggressive behaviour of one subject and the self-injury of another with the application of contingent shock. However, when the first subject returned from a home visit displaying of high rates of aggression again, the authors found the procedure to be much less effective than it had been previously.

**Effect of Aversive Stimulation on Other Behaviour Problems**

Electric shocks have been found successful in reducing aberrant behaviours (behavioural problems). Lovaas et al. (1965) found shock effective in suppressing repetitious body rocking and tantrum behaviour during 70 per cent to 80 per cent of the day in two schizophrenic retardates. When a shock of 1 minute duration was delivered contingently upon rocking and tantrum behaviours, rates decreased immediately to zero and remained there for eleven months. A slight increase was noted after eleven months but shock immediately eliminated the behaviours for the second time.

White and Taylor (1967) reported the successful use of shock to decelerate vomiting and rumination. Initially, they treated two severely retarded individuals for post meal time rumination with contingent application of mild shock. Later, when adaptation occurred, a more severe shock was administered. The inhibitory effects of rumination were
extremely variable. On some days the behaviour rarely occurred, while on other days the rumination was observed to occur at a high rate. Positive side effects of the programme were, however, reported. The subjects increased their food intake, gained weight and appeared to be more aware of their environment.

Hamilton and Standahl (1969) administered shock to control the high rate of disruptive verbalizations characterized as growling responses of an institutionalized and profoundly retarded female. Shock was presented contingent upon growling during the last 15 minute only of each 30 minute session. During the first two shock sessions, no deceleration in the target behaviour was observed. In the two subsequent sessions the behaviour decreased sharply; however, a recovery of the original rate occurred during the following sessions. An increase in the intensity of shock produced an immediate decrease in growling to a near zero level.

In an effort to conduct a systematic analysis of the effects of contingent punishment (shock) on rocking behaviour, Baumeister and Forehand (1972) selected three retarded children who exhibited extremely high rates of this behaviour. During six baseline sessions, the three subjects averaged 22.7, 35.3, and 35.9 responses per minute respectively. During the first training session when 15 seconds' shock was administered contingent upon body rocking, their means dropped to 1.6, 5.1
and .1 responses per minute respectively. The decrement remained at low rates throughout subsequent sessions. The effects of shock were found to be highly situation specific.

Aversive stimulation was not found successful by O'Neil et al. (1979) to reduce rumination. These authors reportedly obtained only slight reductions in rumination with contingent squirts of lemon juice concentrate. The juicer was continuously present in the subject's mouth during treatment, making continued squirts ineffective.

**EFFECTIVENESS OF COMBINATIONS OF METHODS**

Although any of the methods described previously can be combined, certain combinations have appeared in research literature more often than others. The most frequently reported combinations have involved positive reinforcement as one component. Studies on various combinations are as follows:

**Positive and Negative Reinforcement**

A combination of positive and negative reinforcement was used by Gelber and Meyer (1965) who treated a 14 year old boy with an IQ of 117 whose chronic encorpresis and swearing were reported to be his problem behaviours. After hospitalizing the boy in order to gain contingency control, the therapist made time off the ward, the reinforcer for appropriate toilet behaviour. By introducing an aversive condition (being confined to hospital ward) which was terminated following a desired response, negative reinforcement was possible, while punishment
for undesiraole response could be introduced by limiting
time off the ward and restricting the privilege of walking
around the hospital grounds.

Reinforcement and Punishment

Dixon and Bergmann (1975) conducted a study to find
out the combined effect of reinforcement and punishment on
the out-of-seat behaviour. A baseline was obtained over a
five day period for 30 minutes of observation per day. The
mean per cent of intervals in which the girl exhibited the
target behaviour was 68 per cent. During treatment condition
she was verbally praised each time she was found in her seat.
The first day out-of-seat behaviour was 70 per cent of the
time. There was no decrease, so she received praises plus
smiling face on a square paper when she remembered to remain
in her seat for one minute. On the tenth day of the study,
she was found out of seat 53 per cent of the time.

The subject received a jelly bean plus praise immediately
following in-seat behaviour of one consecutive minute. In
addition, she received swat on her posterior whenever she
was out of her seat. This procedure resulted in rapid
decrease in out-of-seat behaviour to a mean level recorded
at 21 per cent. Punishment was administered only three times
during this session.

During a two day reversal procedure, her out-of-seat
behaviour increased to a mean of 72 per cent. When the
last procedure (reinforcement and punishment) was reinstated,
the mean per cent of out-of-seat behaviour decreased to 29 per cent. Post checks were made on 27th and 33rd day of the experiment. Her behaviour was found 27 and 30 per cent respectively.

**Differential Reinforcement and Extinction**

Successful manipulation of aggressive behaviour in 3 to 4 year old boys through use of operant procedures (reinforcement and extinction) had been demonstrated by Brown and Elliot (1965). After 1-week observation to establish base rates, the nursery school teachers directed their attention, as far as possible, to cooperative or non-aggressive behaviours while ignoring aggressive acts. A 2-week treatment period was instated. The results reflected a striking decline in physical and verbal aggression during the second week of treatment period. Verbal aggression did not occur after the first treatment, whereas physical aggression did, possibly because the teachers found it more difficult to ignore fighting than to ignore verbal threats.

Wolf et al. (1965) succeeded in reducing a subject's regurgitation in a classroom setting by combining reinforcement for appropriate behaviours with extinction. Extinction in this case involved terminating the previous practice of returning the student to her living quarters following regurgitation. In another study, Kellerman (1977) reduced unnecessary rising during the night by instructing the
parents to lock the child's bedroom door, to refrain from attending the child's attempts to exit, and to reinforce behaviour other than excessive rising.

**Positive Reinforcement and Timeout**

Combining positive reinforcement with time out has been a common and generally successful approach for reducing aberrant behaviours such as self-injury (Duker, 1975b; Freeman et al., 1975; Myers and Diebert, 1971; Whitney, 1966), noncompliance (Wahler, 1969), rumination and regurgitation (Smeets, 1970), aggression (Vukelich and Hake, 1971) and stereotypy (Luiselli, 1975). A number of similar studies have involved multiple-target behaviours including those listed above as well as inappropriate vocalizations, destruction of property, withdrawal, tantrums, disrobing, and public masturbation (Bostow and Bailey, 1969; Brawley et al., 1969; Kellerman, 1977; Paul and Miller, 1971).

Burchard and Tyler (1965) made use of DRO and time out procedure to reduce anti-social, aggressive-disruptive behaviour of a 13 year old institutionalized delinquent boy. This approach resulted in marked improvement in his behaviour within the institution during a period of five months. Similarly, Repp and Deitz (1974) have reported the successful combination of the whole interval DRO with other procedures i.e. time out to reduce aggressive and self-injurious behaviours of institutionalized retarded children. The child was denied
access to reinforcement for a period of time. If the child made no aggressive responses during the interval, he was given reinforcement when the bell rang. If he made aggressive response, the timer was stopped and he was restrained for thirty seconds of time out.

In addition to the more traditional seclusion and contingent observation time out procedures, Foxx and Shapiro (1978) reduced a variety of aberrant behaviours in a special education classroom by combining DRC with a unique exclusively time out technique. With this approach, time out periods were accompanied by removal of a ribbon each child wore when eligible for participation in classroom activities and accompanying reinforcement. The child remained in the classroom during time-out, but without the privileges afforded to those retaining their ribbons.

Differential reinforcement of incompatible behaviour (DRI) has also been combined with time out by some authors. Weisen and Watson (1967) applied DRI combined with time out to reduce aggressive disruptive behaviours (grabbing, pulling, pushing, and hitting) in a severely retarded institutionalized boy. Candy reinforcement for cooperative interaction with other children was combined with a 5 minute isolation contingent upon the specified responses. The aggressive acts were quickly eliminated by this procedure.

Bostow and Bailey (1969) significantly reduced aggression (hitting, biting, kicking, and scratching) of an institutionalized retardate by delivery of food reinforcement contingent
upon 2 minutes period that were free of aggression (DRI). This procedure was coupled with a 2-minute time out period in an isolation both for each aggressive act. Similar intervention strategy was used for a second retardate who demonstrated frequent verbal disruptions, such as cursing and screaming. Food reinforcement for an incompatible behaviour, remaining quiet, plus isolation for excessively loud verbalizations eliminated these responses. When the contingencies were withdrawn, the aggressive-disruptive acts quickly returned. Subsequent conditioning again eliminated the responses.

Wolfe et al. (1983) examined the effects of a token reinforcement and time out procedure on 3 aggressive pre-school children (aged 3.5 to 4 years) who displayed aggression during peer interactions. A multiple-baseline design across three subjects and two settings (morning and afternoon classrooms) was employed to determine the effects of reinforcement (DRI) on each child's rate of cooperative play and on intervals spent in time out due to aggression. For each session of 15 minutes, subjects were rewarded a token for each minute that they spent in cooperative play and were placed in time out when they exhibited aggression. The programme was effective in increasing cooperative play among these subjects at least 50 per cent over baseline, and behaviour changes were maintained when contingencies were withdrawn.

Differential Reinforcement and Overcorrection

The effectiveness of combining differential reinforcement and overcorrection has been demonstrated with a number of
responses including self injury (Azrin et al., 1975; deCantanzaro and Baldwin, 1978) stereotypy (Coleman et al., 1979; Luiselli et al., 1978) and hand mouthing (Coleman et al., 1979). For example, in a study by deCantanzaro and Baldwin (1978) an arm-movement over correction procedure was combined with DRO periods of 30 seconds to reduce hand-to-head and hand-to-eye self-injurious behaviours of the two subjects. On the other hand, in at least one study, the self-injurious behaviour actually increased in rate following implementation of DRI and over correction (Measel and Alfieri, 1976).

Positive Reinforcement and Aversive Stimulation

Combining positive reinforcement and aversive stimulation has also been reported as a successful behaviour reduction combination for a variety of targets (Altman et al., 1978; Birnbrauer, 1968; Browning, 1971; Callais et al., 1973; Lovaas et al., 1974; O'Neil et al., 1979; Peterson and Peterson, 1968; Ramey, 1974; Wilbur et al., 1974). Electric shock has been the usual aversive stimulus in these combinations, although ammonia inhalation and squirts of lemon juice have also been reported. Also, in some cases success has been achieved by combining reinforcement with verbal reprimands without the use of other aversive method (Bennet, 1980; Repp et al., 1974).

Positive Reinforcement and Response Cost

Perline and Levinsky (1968) employed a combination of the presentation and withdrawal of token reinforcement to
reduce aggression, throwing objects, and out-of-seat behaviour. In addition to giving tokens to responses incompatible with aggressive-disruptive behaviours, the investigators also withdrew tokens (response cost) contingent upon the occurrence of the deviant acts. Over a 5-day period the token present-action and withdrawal of tokens produced a daily mean decrement in frequency of aggressive-disrupting behaviours of 58 responses.

Repp and Deitz (1974) combined DRO with fines (response cost). Tokens were earned for five minutes during which aggressive behaviours did not occur. Each inappropriate response resulted in loss of tokens. DRO procedure combined with response cost proved to be manageable for the teacher and successful in reducing aggressive behaviour.

Reinforcement, Time out, and Aversive Stimulation

There are several reports in which response suppression has been achieved by combining reinforcement, time out, and aversive stimulation. In many of these studies, the only aversive stimuli were verbal reprimands (Ausman et al., 1974; Hall et al., 1973a; Wiesen and Watson, 1967; Whitney, 1966). Others, however, involved electric shock (Lovaas et al., 1973; Romanczyk and Goren, 1975; Tate, 1972) or taps on the hand or fingers with a piece of wooden dowel rod contingent on self-injurious behaviour (Singh, 1976, 1977; Singh and Pulman, 1979).
Positive Reinforcement, Time out and Extinction

A study was reported by Zeilberger et al. (1968) who described a 56 month old boy whose objectionable behaviour included, screaming, fighting, bossing, and disobedience. Physical aggression against other children while playing in his own house, non compliance with his mother's instructions, yelling at and bossing other children were selected as target behaviours of the boy. After 10 daily one-hour sessions during which baseline observations were conducted, both of the boys' parents were instructed by the investigators in the use of a combination of positive reinforcement, time out, and extinction. These were to be employed contingent upon aggression and disobedience or on such desirable alternatives as cooperative play and compliance with instructions. In the course of 10 sessions during which these contingencies were in effect, the boy's behaviour showed a marked change. Whereas he had followed parental instructions an average of 23 per cent in the baseline, he now averaged 78 per cent. Aggressive behaviour reflected similar improvement for while this had been taking place at an average of 7.6 per cent of the time during baseline, it dropped to zero by the third day of treatment phase and occurred only rarely thereafter.

Differential Reinforcement, Extinction, and Punishment

At least one study had been reported on the combination of differential reinforcement, extinction, and punishment.
Bernal et al. (1968) conducted a study on an eight and a half-year-old boy who had been quite unmanageable. His mother was taught to ignore his abusive behaviour unless it was excessive, in which case she was to express anger or to spank the child. At the same time, she was to provide positive reinforcement for acceptable behaviour. This combined procedure successfully reduced the boy's unacceptable behaviour and increased acceptable behaviour within three weeks. The progress was maintained over a 23-week follow-up period.

**COMPARISON BETWEEN METHODS**

Various behaviour reduction methods have been compared with each other to see their effectiveness. Mulick et al. (1981) compared the effectiveness of several types of differential reinforcement with extinction for reducing regurgitation, and collateral behaviours. Extinction appeared to be less effective than the positive-reinforcement methods.

Differential reinforcement has also been compared to time out procedures, but with mixed results. Peterson and Peterson (1968) were successful in using a DRI procedure for decreasing self-injurious behaviour after a combination of DRO and time out had failed. Several manipulations in a study by Vukelick and Hake (1971) indicated that social reinforcement (either DRO or DRI) combined with time out was more effective for reducing aggressive choking and grabbing than time out.
alone or in combination with non-contingent attention. Similarly, DRC was found more effective than time out in reducing a subject's self-injurious and aggressive behaviour in a case study reported by Frankel et al. (1976). However, adding 3-minute periods of seclusion i.e., time out to DRO and DRI procedures already in effect reportedly reduced stereotypic body rocking below levels achieved with differential reinforcement alone (Luiselli, 1975). Also, the combination of time out and DRO used by Foxx and Shapiro (1973) appeared more effective than DRO alone in reducing self-injury, aggression, and classroom disturbances among five retarded subjects.

A number of studies have shown that adding over correction to differential reinforcement procedures already in effect resulted in greater response suppression than that obtained with reinforcement alone (Azrin et al., 1973; Luiselli et al., 1977, 1978; Measel and Alfieri; 1976). Also, Harris and Wolchik (1979) have suggested that replacing a DRO approach with positive practice procedures reduced the various stereotypies of four subjects after the DRC procedure had failed.

Good results have been obtained by adding aversive stimulation to reinforcement methods or by replacing the reinforcement methods altogether (Altman et al., 1978; Corte et al., 1971; Murphy et al., 1979; Risley, 1968; Singh and Pulman, 1979). On the other hand, adding DRO to aversive stimulation procedures may result in greater response suppression than that achieved with aversive stimulation
CONCLUSION

On the basis of review of related literature quoted above, it can be concluded that aggression and other inappropriate behaviours in children can effectively be suppressed or reduced with the help of positive reinforcement and punishment procedures though negative results have also been reported. Extinction techniques are weak relative to other methods. Differential reinforcement and time out appear to be equal in terms of effectiveness. Though single procedures of reinforcement, extinction, and punishment have proved successful in reducing aggression and other aberrant behaviours, combinations of two or more methods have been proved superior to single procedure.

Almost all the studies quoted above have been conducted abroad. There is a scarcity of such researches in Indian situations. It is a dire necessity to conduct research in this field and implement it in order to eliminate or at least reduce the aberrant behaviour found in children. Keeping this seriousness of problem of prevailing aberrant behaviours especially aggression in pre-school children in view, attempt has been made by the investigator to find out the effectiveness of various behaviour modification techniques i.e., DRO, DRI, Time out, DRO and Time out, and DRI and Time-out.