

## Clinical Section

# REINFORCEMENT SCHEDULES AND THE MANAGEMENT OF CHILDHOOD BEHAVIOURS

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**Abstract.** Where a behaviour has been maintained on a variable schedule of reinforcement theoretically it should be possible to reduce resistance to extinction by first putting the behaviour onto a continuous schedule of reinforcement. This approach has been employed in animal research but rarely with human participants, and where it has, with little success. This study describes the use of the approach to overcome some minor problems in the behaviour of young children, the problems being sufficiently troublesome for the parents to consult their GP. All the families who used the approach were successful in remediating the behaviour. Some reasons for this success, in contrast with the disappointing outcomes of some of the earlier research, are discussed. Although the study lacks formal controls it is suggested that the approach could be usefully applied to other common childhood behaviours that have been subjected to variable reinforcement.

*Keywords:* Reinforcement schedules, extinction, child behaviour management.

### Introduction

Behaviours that have been subjected to reinforcement on a variable schedule are more resistant to extinction than those for which a continuous schedule has been used (Bandura, 1969, p. 29). Thus a child reinforced every time a particular behaviour occurs will be likely, if the reinforcement is no longer forthcoming, to give up the behaviour quickly; whereas a child reinforced on a variable (i.e., occasional and unpredictable) schedule is likely to persist with the behaviour longer in the absence of reinforcement. Such resistance is welcomed – indeed, worked for – where the behaviour in question is a positive one (La Vigna & Donnellan, 1986, p. 53). Where a problem behaviour is

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concerned, however, resistance to extinction constitutes a barrier to the achievement of the desired outcome. Resistance to extinction may be strengthened still more if the reinforcement schedule is at times considerably stretched; typically, this may occur during the extinction process, “particularly if (the behaviour) goes on unabated or increases in rate or intensity (when) any reinforcement . . . will reinstate the behaviour, often at a higher level than if extinction had not been attempted”. (Bandura, 1969). So a mother who can resist pleading and whining may falter when screaming ensues and be driven to give the reinforcement, thus teaching the child that persistence pays off and screaming is a more successful strategy than whining.

Where such a process has been gone through, and a problem behaviour has been maintained by a variable schedule of reinforcement, it should theoretically be possible to weaken resistance to extinction by first transferring the behaviour to a continuous reinforcement (CRF) schedule. Animal research has tended to support this hypothesis (Stalling, Moreland, Merrill, & Scotti, 1981; Fitzgerald, Vardaris, & Teyler, 1966) although in some cases contrary conclusions have been reached (Theios, 1962; Sutherland, Mackintosh, & Wolfe, 1965). Studies on human participants have had mixed results. Spradlin (1962) used a variety of reinforcement schedules to teach a response to children with severe learning disabilities, and found extinction to be fastest for those who had acquired the response under uninterrupted continuous reinforcement conditions, but no advantage to those for whom partial reinforcement was followed by a continuous schedule before extinction. However, Neisworth, Hunt, Gallop and Madle (1985) provided two men with severe learning disabilities with continuous reinforcement for behaviours that were already being maintained on a variable schedule of reinforcement. When the continuous reinforcement was stopped the rate of the behaviour dropped below the initial baseline level, and for one man this effect lasted over a two week follow-up. Foxx and McMorro (1983) carried out two experiments designed to alter rates of stereotypies: two women with severe learning disabilities were first given ice-cream contingent on every occurrence of the stereotypy; and later cessation of this reinforcer resulted, in the first case, in an immediate reduction of the stereotypy to below baseline level, and in the second, an initial marked increase and then a reduction of the behaviour to around baseline level. Schmid (1986) targeted mildly disruptive behaviours in the classroom (head turning, off task etc.) in six adolescents with varying degrees of learning disability. Edibles and praise were used as reinforcers on a CRF schedule before moving on to extinction. In all six cases extinction (the discontinuation of the use of the edibles and praise) resulted in an immediate drop in the disruptive behaviours to below baseline.

Two successful single-case studies have been reported. In the first, Glavin and Moyer (1975) reduced the crying of an eight-month-old (the son of one of the authors) when he was put in his playpen, by first immediately reinforcing the crying every time it occurred, and then stopping reinforcement of the crying altogether. In the second, Carr (1988) used a similar approach to deal with night time disturbance in a small dog. However, there is little evidence of this approach being adopted in the clinical management of problem behaviours. This paper looks at some aspects of the role of reinforcement in two behaviours of childhood, and reports some case studies in which the principle of first shifting from variable to continuous reinforcement was used to facilitate the extinction of problem behaviours.

### Participants

Participants in the study were children aged between 5 months and  $2\frac{1}{2}$  years who between May 1995 and August 1997 were brought to the GP (the first author) in Melbourne, Australia, by their parents because of difficulties in managing some aspect of their behaviour. Fifteen families, all but one from middle-class backgrounds (social class assessed as is usual by reference to the father's occupational group) were initially enrolled in the study but complete data are available for only 11: two refused the programme and two were untraceable at follow-up. One mother's concern was that her daughter was continuing at the age of  $2\frac{1}{2}$  to demand breast feeding; for the remainder the problem was that of sleeping. Since these are very different problems they will be described separately.

#### *Breast feeding*

Mrs F was the wife of a GP and mother of two children aged 5 and  $2\frac{1}{2}$ . The younger child, Paula, had been very reluctant to wean despite the mother's vigorous attempts, and Mrs F presented in some desperation. A pattern emerged of occasional morning and evening feeds "on demand" but also frequent episodes during the day when Paula would come to her mother and pester her for a feed. Sometimes these attempts were resisted with refusal or distraction, but sometimes, and unpredictably, her mother would say "Oh all right". Paula had begun to develop the tendency, when out with her mother, to climb on her lap and pull at her blouse, a behaviour that was sometimes successful in getting her a feed. It was this last behaviour that particularly upset and embarrassed Mrs F.

Paula was a healthy girl, of above average height and weight, and with no medical problems. The family were well and with no unusual stresses or difficulties.

#### *Sleep*

Complete data in this part of the study were obtained from 10 families (Table 1). The average age at presentation for these 10 children was 9 months, range 5–16 months. The history given by the parents followed a fairly stable pattern: in every case the baby failed to settle at and woke during the night, and the parents tried repeatedly to soothe him or her, the commonest strategies involving dummies, cuddles and feeds (bottle or breast). The parents of six babies (B, F, G, H, I, and J) had tried the method known as "controlled crying", which involves going into the crying child's bedroom, giving soothing pats, strokes and murmurs but no lifting, cuddling or feeding and leaving the bedroom again even if the crying continued or was resumed, and repeating the process ad lib (see Ferber, 1985), but had not been successful with it. All the remainder said they had tried leaving their babies to cry "a bit" but in the end had felt forced to go in and comfort them. Three mothers and their babies (B, J, and K) had been admitted to specialist "mother and sleepless baby" hospital in-patient units (whose regimes varied but usually involved some form of controlled crying) for periods of 1–2 nights, but the babies continued to wake at night. Three babies (A, B, and F) had at one time slept through the night but this had then broken down. In each case it seemed probable

**Table 1.** Characteristics of participants in the sleep study, and outcome

Case	Sex	Age at 1st presentation (months)	Previous		Result*	No. of nights to success	Follow-up (months)
			CC*	SH*			
A	M	7	No	No	√	2	4
B	M	10	Yes	Yes	√	7	4
C	M	6	No	No	—	lost	—
D	M	14	No	No	√	1	2
E	M	6	No	No	√	3	6
F	F	7	Yes	No	√	4	2
G	M	5	Yes	No	√	3	3
H	F	7	Yes	No	√	5	6
I	M	12	Yes	No	—	lost	—
J	M	6	Yes	Yes	√	5	2
K	M	7	No	Yes	—	refused	—
L	M	16	No	No	√	7	3
N	M	10	No	No	—	refused	—
O	F	9	No	No	√	1	8

\*Note: CC = Controlled crying.

SH = Sleeping hospital (specialist parent and sleepless baby inpatient unit).

Result: √ = child slept through for the first time in (number of nights in next column).

that the baby's crying had been reinforced on an intermittent variable schedule by parental comforting.

## Method

### *Breast feeding*

The concepts of continuous and variable reinforcement were explained to Mrs F and she easily understood the theoretical reason for shifting to continuous reinforcement before beginning to wean. It was suggested that the behavioural strategy be complemented by some discussion with Paula about what was going on. Mrs F felt comfortable with talking to Paula about how the feeding had become a problem and that they were going to do something to help sort it out. The following programme was agreed on:

Days 1–5: On demand breast feeding.

Days 6–7: Continue demand-feeding; explain to Paula that soon she will have to stop breast feeding.

Day 8 and after: No more breast feeds at all.

### *Sleeping*

As with Mrs F, the concepts of differing schedules of reinforcement were discussed with the parents. They were asked to settle the child in bed using whatever had been their customary method – giving a dummy, cuddling, feeding, taking into their own

bed, etc. – and, using the same methods, to attend immediately to any crying during the night. They were asked to continue this regime for 5–7 nights (thought to be as much as the parents would be able to stand), after which they should move on to controlled crying, and not give any of the previously-used comforts, either at bedtime or if the child woke during the night. Initial discussion of the method, usually with the mother, was reinforced by a two-page written handout and advice to read the detail of controlled crying in Ferber (1985) and to discuss the process with their partner. They were invited to return with their partner for further discussion if they wished. The method of controlled crying recommended varied from Ferber (1985) only in that parents were advised not to extend the time between visits to the baby but to go in regularly at five minute intervals.

Before considering any behavioural intervention, each child and his or her parent(s) was assessed by the GP. Factors such as the parents' own emotional needs, pressures within and external to the family, attitudes to breast-feeding etc., were explored and if possible addressed. Only where it seemed appropriate was a behavioural programme suggested.

All the data, concerning both feeding and sleep problems, were derived from informal reports from the parents, either when they telephoned or visited the GP's surgery.

It will be apparent that the project was undertaken in the first place, not as a scientific study but with the aim of helping harassed (sometimes desperate) parents.

## Results

### *Breast feeding*

The programme went smoothly. Paula cried and fussed “a bit” on Day 8, but showed very little of the blouse-tearing behaviour that had been so persistent before. On Day 9 Paula made a few desultory attempts at getting a feed and by Day 10 she was described by Mrs F as being quite content to drink cow's milk from a bottle or cup. Follow-up four months later showed that all remained well.

### *Sleeping*

From the inception of the extinction programmes sleeping through the night, defined as uninterrupted sleep from bedtime to, at earliest, 6.30 a.m., for the 10 children for whom there are complete data, was achieved (i.e., the baby slept through the night for the first time and continued to do so thereafter) in a mean of 3.8 nights, range 1–7. Follow-up at an average of four months later showed that they continued to have uninterrupted nights, with two minor exceptions: child B was said at follow-up to wake occasionally when he needed no more than lying down again in bed, and two months later he was sleeping through the night; and child F, after sleeping satisfactorily for two months, developed an upper respiratory tract infection and relapsed, but with the reinstatement of controlled crying quickly went back to sleeping through the night. The case of child H is slightly different, in that, after making good progress during the first three nights of the extinction programme, the family moved house, and it then required two more nights of the programme for her to sleep through the night.

### Discussion

Eleven parents, who had previously tried unsuccessfully to overcome minor problems in their children's behaviour, subsequently succeeded when they first put the behaviour in question onto a continuous schedule of reinforcement, and then followed this by extinction. No parent who embarked on this regime reported failure, nor was there any report of spontaneous recovery of the behaviour, which has been noted as a hazard of extinction programmes (Kazdin, 1975, pp. 181–182). Success was maintained over at least a number of months, in contrast with the two weeks reported for one of two participants (Neisworth et al., 1985), while Foxx and McMorro (1983) suggested that the positive effects they observed were only temporary. One reason for this difference between the present and some previous investigations may lie in the reinforcers used in the CRF phases of the programmes. In other studies the reinforcers that had established and were maintaining the behaviours were not (perhaps could not be) identified, and other reinforcers were employed, albeit ones that had been shown in preference tests to be frequently chosen by the participants (Foxx & McMorro, 1983; Schmid, 1986). In the present study it is virtually certain that the reinforcers used in CRF were those that had established the behaviour in the first place. Consequently, when in the extinction phase these were discontinued it was unlikely that, as in the previous studies, other reinforcers were still in place to maintain the behaviour.

In some earlier research undesirable side effects, such as anger, have been seen to occur following extinction (Hutchinson, Azrin, & Hunt, 1968; La Vigna & Donnellan, 1986, p. 163). Kazdin (1975, pp. 182–183) suggests that, since in extinction reinforcement is lost to the participant, it should be provided for an alternative response, and this tactic has often been recommended to accompany extinction or time-out programmes (Murphy, 1987; Carr, 1995, pp. 87–88). Glavin and Moyer (1975) attribute the success of their intervention partly to the fact that, in parallel with the extinction phase of their study, reinforcement was given for an alternative behaviour (non-crying). Since in the main part of the present study the desired behaviour was sleeping, reinforcing this, by waking up the baby for cuddles etc., was not an option. The only strategy employed here was extinction, and it may be seen as the more surprising that the success rate was as high as it was, and that no undesirable side effects were noted. Indeed several parents said that they wished they had undertaken the programme months ago; the whole family was so much happier now.

On the face of it, the idea of setting out to reduce a problem behaviour by first encouraging it would appear to be counterintuitive. Murphy (1978) remarks that "it would presumably be difficult to convince untrained staff of the logic of this kind of strategy". In the present study the parents had little difficulty in understanding the point of what they were being asked to do, and appeared to carry through consistently the CRF phase of the treatment. One father, of child N, could not accept the rationale of the procedure, and another family (K) refused the programme, opting instead for admission to a specialist parent and sleepless baby inpatient unit: at follow-up, 4 and 6 months after the initial discussion with the GP, both children continued to present sleeping problems.

As it happened, all the families except one were from middle-class backgrounds. This raises the question of whether the method described could be used successfully with

families with fewer educational advantages. In the present study family G came from a lower working-class background, both parents were 20 years old, and this, their first baby, had severe congenital heart problems in addition to his poor sleep. They were dubious about embarking on the programme, but did so, albeit with a good deal of coaching from the GP, and carried it through, leading the GP later to remark, "They were probably the most grateful of the whole bunch". This limited experience suggests that the method should not be ruled out for any family; some families may need extra professional input, but the outcome may prove especially rewarding for both the family and the professional.

Although the results described here suggest that the use of interpolated continuous reinforcement facilitated later extinction, a flaw in the study is the lack of control data. This was not practicable in the present context, that of a busy general practice. Nevertheless, ideally another mother of a child reluctant to wean would have been asked only to be more resolute in refusing breast feeding, and a second group of parents of sleep disturbed children would have been asked to go straight into controlled crying, in order to demonstrate whether CRF expedited, or facilitated, achievement of the desired goals. In the event, no other mother has presented at the surgery with a problem similar to Mrs F's; in the case of the sleep problems, over half the parents had previously attempted controlled crying in its standard form, but were successful, in the case of the five who undertook it, only when they followed the regime described here. Whether all these families would have had an equally good outcome by using extinction, without first using CRF but with the support of their GP, remains a possibility that requires further research to elucidate.

Nevertheless, the pattern shown by many simple childhood behaviour problems indicates that they may have been established, or are being maintained, by reinforcement delivered on an intermittent schedule; the child who screams for, and occasionally gets, sweets at the supermarket is one example. The case examples outlined above suggest that a similar approach to the one used here, of moving to CRF prior to extinction, may be worth considering.

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