MAINTAINING REDUCTIONS IN CHALLENGING BEHAVIOURS: A REVIEW OF THE LITERATURE

Simon Whitaker

Introduction

Applied behaviour analysis has been a great help in understanding challenging behaviour. The work on functional analysis has demonstrated that challenging behaviours are often maintained by the reinforcing consequences they produce (Carr et al., 1980; Iwata et al., 1994a;b). Horner and Day (1991) and Horner et al., (1990) have shown that if a client has alternative behaviours available that generate the same consequences with less effort and more immediately, the client will use these instead of the challenging behaviours. It follows that clients will show a challenging behaviour when they discriminate that it is likely to generate a reinforcer, is unlikely to be punished (c.f. Azrin and Holz 1966) and they have no other behaviours in their repertoire that are as likely to generate the same reinforcers as soon.

The commonly used methods of reducing challenging behaviour of differential reinforcement and ecological intervention (c.f. Whitaker 1993) easily fit into this conceptualisation. Differential reinforcement works by arranging for alternative behaviours to result in more reinforcement than the challenging behaviour. Ecological intervention changes a client’s environment/routine so the contingencies of reinforcement supporting the challenging behaviour no longer apply. However, the above model of challenging behaviour predicts that once an intervention is withdrawn, and the contingencies of reinforcement supporting the challenging behaviour again apply, the challenging behaviour will return. If this is the case then one will only achieve a continued reduction in challenging behaviour if the intervention remains in place, which will necessitate continued external controls to run the intervention. However, there are a number of studies that report continued reduction in challenging behaviours after the intervention has stopped. It is the purpose of this paper to consider why this maintenance of treatment effect sometimes occurs.

Systematic searches of the literature have already been done for two recent reviews on the reduction of challenging behaviour in people with learning disabilities.
disabilities. Whitaker (2000) looked at all studies that reported reducing challenging behaviour over a 10 year period in six leading journals and Whitaker (2001) reviewed the use of anger and self-control methods with people with learning disabilities. The studies considered for these reviews, together with other and more recent studies, were examined to see if they reported a continued reduction in challenging behaviour after the active intervention was withdrawn. The criteria for inclusion in this current review were as follows:

- That the client in the study had a learning disability.
- That the intervention was evaluated in term of a reduction in overt behaviour.
- At least a 70+% reduction in the level of challenging behaviour was still apparent at follow-up.
- That the intervention had a clear effect on the client’s life and was not just a demonstration that an intervention continued to be effective during short sessions in a controlled setting (c.f. Foxx 1996). Therefore, studies were only included if the follow-up was done in the setting in which the client would normally spend a substantial amount of his/her time and the data taken reflected the client’s behaviour over a substantial period of the day.
- That the maintenance was long term and was not due to temporary factors such as the client not yet having learned that the intervention was no longer in place. Therefore studies were only included if the follow-up was done at least one month after the end of any active treatment.

**Studies including maintenance**

TABLE I shows the studies that were identified fulfilling the above criteria presented for each of the major interventions that were used.

It is striking how few studies meet the above criteria: only nineteen. This compares with the 247 studies reported on by Whitaker (2000) on the reduction of challenging behaviour generally. Although many of the studies reviewed by Whitaker (2000) were not designated to look for maintenance it still suggests that achieving maintenance after treatment has been discontinued is very much the exception rather than the rule.

**Mechanisms by which maintenance occurs**

The bulk of the studies use methods that give the client a new skill or ability which enable them to control their own behaviour and/or access reinforcers that would support appropriate alternative behaviours. This includes the studies in which the client is taught to self-manage his/her own behaviour, those in which he/she was taught cognitively based methods of self-control and the study that makes use of functional communication training in which the clients are taught a more appropriate way of communicating their needs.

Self-management (c.f. Shapiro 1986) makes up nearly a third of all the studies. It is a behaviourally based method of self-control, which involves teaching the client to self-monitor, and possibly also self-evaluation and self-consequence his/her own behaviour. These studies, together with the studies that used cognitively based self-control procedures, suggest that training people with learning disabilities
### TABLE I

**Self-Management**

<table>
<thead>
<tr>
<th>Study</th>
<th>Clients</th>
<th>Setting</th>
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<tbody>
<tr>
<td>Cole <em>et al.</em> (1985)</td>
<td>Six adults with mild and moderate learning disability</td>
<td>Day placement workshop</td>
<td>9 months</td>
<td>They were trained to control their own disruptive behaviour via self-management and self-instruction. Following training the prompts to self-manage and self-instruct were faded out. The rate of disruptive behaviour was found to be still near zero, under baseline conditions.</td>
</tr>
<tr>
<td>Gardner <em>et al.</em> (1983a)</td>
<td>A man of 26 with a moderate learning disability</td>
<td>Day placement workshop</td>
<td>12 months</td>
<td>He was trained to control his own disruptive behaviour via self-management and self-instruction. Following training the prompts to self-manage and self-instruct were faded out. The rate of disruptive behaviour was found to be still near zero, under baseline conditions (in which he was rewarded for appropriate behaviour).</td>
</tr>
<tr>
<td>Gardner <em>et al.</em> (1983b)</td>
<td>A man with moderate learning disabilities</td>
<td>Day placement workshop</td>
<td>6 months</td>
<td>He was trained to control his own disruptive behaviour via self-management and self-instruction. Following training the prompts to self-manage and self-instruct were faded out. The rate of disruptive behaviour was found to be still near zero, under baseline conditions (in which he was rewarded for appropriate behaviour).</td>
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<tr>
<td>Koegel and Koegel (1990)</td>
<td>Two children with autism and severe learning disabilities</td>
<td>School for one child home for the other</td>
<td>13 weeks for one child 23 weeks for the other</td>
<td>The children were initially taught to self-manage their own stereotypic behaviour in a lab setting, the procedure was then used in the home for one child and the school for the other were prompts and materials were faded out. The rate of stereotyped behaviour was found to be near zero at follow-up under baseline conditions</td>
</tr>
<tr>
<td>Stahmer and Schreibman (1992)</td>
<td>Three children with moderate or mild learning disabilities</td>
<td>In a clinic for 2 children and bedroom at home for third</td>
<td>1 month</td>
<td>The children were taught to self-manage toy play, once this had been established the trainer and prompts were faded out. This not only resulted in an increase in toy play but a reduction in stereotypic and other disruptive behaviour. The effect was still apparent at 1-month follow-up and generalised to other settings including home.</td>
</tr>
<tr>
<td>Zegiob <em>et al.</em> (1978) Client 1</td>
<td>Girl with mild learning disability</td>
<td>Residential training facility</td>
<td>6 months</td>
<td>The girl was taught to self-monitor her own nose and mouth picking and praised for doing so. The prompts and praise were then faded out. When she was followed-up 6 months after the terminations of the programme the nose and mouth picking was still at a low rate.</td>
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**Cognitively based self-control**

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<tr>
<td>Lindsay <em>et al.</em> (1997)</td>
<td>Two men with mild learning disabilities</td>
<td>Home and community</td>
<td>12 months for first client 3 months for the second</td>
<td>Used a modified version of Beck’s Cognitive Behaviour Therapy for Anxiety, replacing anxiety provoking thoughts with more appropriate ones, to stop fire setting in the first client and panic induced aggression in the second.</td>
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<tr>
<td>Lindsay <em>et al.</em> (1998) Mr. C.</td>
<td>Man with mild learning disabilities</td>
<td>Hospital and then a community placement</td>
<td>9 months</td>
<td>Initially the man’s lack of motivation to engage in treatment was addressed by Socratic questioning and inductive reasoning. He then co-operated in a cognitively based anger control programme. As a result of which his aggression decreased and he was found a community placement.</td>
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<tr>
<td>Rose (1996)</td>
<td>Five adults with mild to severe learning disabilities</td>
<td>Home and or work</td>
<td>Between 1 and 3 months</td>
<td>Attended an anger control group and in one case had individual counselling. There was a continued reduction of anger outburst outside the group. However, staff for home or work also attended the group and it is not clear if the change in clients behaviour was due to staff treating them differently</td>
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<tr>
<td>Durand and Carr (1991)</td>
<td>Three children with moderate or severe learning disability</td>
<td>School</td>
<td>Beginning of the next academic year</td>
<td>Following a functional analysis, which showed their aggression and/or self-injurious behaviour to be motivated by escape for demands or staff attention, the children were trained to ask staff for help or for attention. The challenging behaviours reduced. The effect spontaneously generalised to a naive teacher the next year for 2 of the children.</td>
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<tr>
<td>Luiselli et al. (1977)</td>
<td>Boy with a mild learning disability</td>
<td>Treatment unit</td>
<td>12 months</td>
<td>The boy’s in-class masturbation was initially eliminated by a combination of reinforcing academic work and overcorrection. After 33 days all formal treatment was stopped, although, as did the rest of the class, successful performance was still reinforced. His rate of masturbation was still zero at follow-up.</td>
</tr>
<tr>
<td>Luiselli and Gleason (1977)</td>
<td>Girl with severe learning disability and rubella syndrome</td>
<td>Specialised day treatment programme</td>
<td>1 year</td>
<td>The girl’s refusal to eat anything but milk and occasional baby food was treated by gradually fading texture into her food and prompting and reinforcing appropriate eating. Reinforcement was then eliminated. At follow-up she was still eating appropriately and the effect had generalised to another trainer but not to her home.</td>
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<tr>
<td>Pace et al. (1986)</td>
<td>Man with profound learning disability</td>
<td>Hospital and the community</td>
<td>2 years</td>
<td>At the beginning of the study the man self-restrained from self-injury by putting his arm in rigid tubes. The length of the tubes were gradually reduced and eventually replaced with wristbands. At follow-up he continued to wear the wristbands 24 hours a day and his self-injury remained at a low level.</td>
</tr>
<tr>
<td>Piazza et al. (1998)</td>
<td>Girl with severe learning disability</td>
<td>Specialised treatment unit and then home</td>
<td>4 months</td>
<td>Over 11 days the girl’s poor sleep pattern was treated by getting her to go to bed 1 or 2 hours late each night until her bedtime was brought back from 3:30 a.m. to 7:00 p.m. The effect generalised to her home on discharge.</td>
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<tr>
<td>Weinman et al. (1990)</td>
<td>Woman with moderate learning disability</td>
<td>Stable institution then a group home</td>
<td>11 months</td>
<td>The woman’s refusal to eat was thought to be a conversion reaction due to sexual abuse. It was treated by relaxation before meals and then reinforcing successive approximation to eating appropriately. She was found to be eating normally when follow-up.</td>
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**TABLE I (continued)**  
**Functional Communication Training**

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**Contingency management**

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**Stimulus Fading**

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to self-regulate can produce a lasting and generalised effect. This is consistent with Whitman’s (1990) ideas that a failure to self-regulate is a fundamental problem in people with learning disabilities and that treatment should aim to correct this. However, training people with learning disabilities to use self-control is a method that may only be applicable to clients with sufficient linguistic or cognitive ability (c.f. Whitaker 2001). The other limitation to self-control producing successful maintenance is the need for naturally occurring reinforcers to maintain its use. Self-control has been conceptualised as the ability to access larger amounts of reinforcement after a delay rather than smaller more immediate refinement (c.f. Dixon et al., 1998; Fisher and Mazur 1997; Vollmer et al., 1999). It follows from this that, if a client is going to use self-control to suppress a challenging behaviour, there must be delayed contingencies of reinforcement that would support this act of self-control.

Although it is sometimes possible to identify these contingencies, for example Lindsay et al. (1998)s’ client recognised that his anger resulted in his losing community placements, in most studies it is not clear what the reinforcers are. This, however, does not mean that such contingencies are not there in these studies or that it is not necessary for them to be there.

In addition to training clients in self-control a further study made use of functional communication training. Having found that the clients’ challenging behaviour communicated their need for attention and/or help from staff in the classroom Durand and Carr (1991) trained children to ask help or attention. Hence the client was given alternative behaviours that were reinforced by naturally occurring reinforcers i.e. the way staff responded to their requests for attention and help. Again, for functional communication training to successfully

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<td>Beail (1998)</td>
<td>20 men with mild to severe learning disabilities</td>
<td>Various community settings</td>
<td>6 months</td>
<td>20 men who displayed challenging or criminal behaviour were given between 3 and 38 months of weekly dynamic psychotherapy. At the end of treatment and later at follow-up the rates of the target behaviours were zero in all but one case.</td>
</tr>
<tr>
<td>Beail (2001)</td>
<td>13 men with learning disabilities who had committed an offence</td>
<td>Community</td>
<td>4 years</td>
<td>The men were given between 4 and 43 months of weekly dynamic psychotherapy. Non re-offended during treatment and only 2 re-offended during the follow-up period.</td>
</tr>
<tr>
<td>McNally and Lukach (1991)</td>
<td>Man with mild learning disability</td>
<td>Community</td>
<td>Not clear but greater than a month</td>
<td>He was treated for masturbating in front of dogs by masturbation satiation, covert sensitisation and avoiding setting that may provoke the behaviour. This resulted in a reduction in his sexual arousal to dogs and there were no more reported incidents of him masturbating in front of dogs.</td>
</tr>
<tr>
<td>Touchette et al. (1985) Case 1</td>
<td>Girl with severe learning disability</td>
<td>Residential school for people with autism</td>
<td>One year after beginning of treatment</td>
<td>Her aggression was found to be most frequent during her afternoon class. Her schedule was therefore changed. The original programme was then gradually faded back.</td>
</tr>
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</table>
result in maintenance, it is clearly necessary for there to be a naturally occurring reinforcer that will maintain the alternative appropriate behaviour.

Although training the client to obtain naturally occurring reinforcers in an appropriate way may be an important method in getting a continued suppression of challenging behaviours without the continued use of external controls, it is not the only method. Several studies in TABLE I appear to produce maintenance without overtly giving the clients new skills or abilities. It is not possible to clearly identify the mechanisms by which maintenance is produced, however, there are a number of suggestions as to why maintenance occurred:

• **Bringing appropriate behaviours in a client’s repertoire into contact with naturally occurring reinforcement for long enough to strengthen them, so that they are used as an alternative to the challenging behaviours.** An example is Luiselli et al. (1977) who used overcorrection to stop a child masturbating in class and found a continued zero rate at 12 months follow-up. It is notable that prior to and during treatment the client could receive praise and token rewards for academic work but, as his masturbation severely limited his teacher’s interaction with him, he did not gain these rewards until the masturbation stopped. The authors suggested that the main contribution of the overcorrection was to suppress the masturbation allowing alternative behaviours to be strengthened.

• **Changing the stimuli controlling the challenging behaviours and/or appropriate behaviours.** For example Pace et al. (1986) changed the inhibitory stimulus of self-injury from the inappropriate one of rigid tubes to wristbands by gradually reducing the length of the tubes and then replacing them with wristbands. It is not clear in this study what role naturally occurring contingencies had, however, experimental work on stimulus control shows that for stimulus control to develop these stimuli must be paired with reinforcement (c.f. Terrace 1966), and therefore it is likely that for maintenance to be achieved by changing stimulus control these contingencies would have to be in operation.

• **Desensitising the client to stimuli that produce an emotional response.** For example Touchette et al. (1985) presented a case of an adolescent girl whose aggression occurred most frequently during her afternoon class. Aggression was initially reduced by no longer requiring her to attend this class. Elements of the class were then gradually reintroduced into her afternoon routine. At follow-up a year later she was again participating in the class. A plausible explanation for this result is that the procedure desensitised her to the emotional response provoked by attending the class. It is also possible that desensitisation occurred in the studies by Luiselli and Gleason (1987) and Weinman et al. (1990) in both of which an emotional reaction to food was eliminated by gradually introducing closer approximations to normal food or normal eating. Desensitising a client to an emotionally provoking stimulus could be conceptualised as changing their motivations as they would no longer be motivated to avoid the previously emotionally provoking stimulus.
• **Changing the client’s motivation.** A change in the client’s motivations may also have been the reason for the long-term change in the sexual behaviour of the client reported on by McNally and Lukach (1991), who after treatment no longer wanted to masturbate in front of dogs. It is more difficult to conceptualise the mechanism of change that produced maintenance in the two studies by Beail (1998, 2001) that made use of dynamic psychotherapy, as no common concepts are used in dynamic psychotherapy and the model used here. Space is not available for a detailed discussion of how the two approaches could be reconciled, however, in broad terms psychotherapy could also be considered to change the client so that he/she is no longer motivated to show challenging behaviour.

**The use of fading**

Fading was used to some extent in 11 out of 19 studies in Table I and therefore may be an important and sometimes necessary procedure in achieving maintenance. In the context of maintaining a reduction of challenging behaviours after treatment has finished, fading involves gradually reducing the external controls over the challenging behaviours and replacing them with naturally occurring stimuli.

It would seem to be necessary as abrupt change would result in the challenging behaviour which in turn may prevent naturally occurring stimuli developing inhibitory control over the challenging behaviour. For example, in the study by Luiselli and Gleason (1987), where milk was gradually replaced by more solid food; had the solid food been introduced straight away it would have provoked temper outbursts which would have made eating an aversive experience, resulting in more food refusal.

**Discussion**

The studies in Table I are broadly consistent with behavioural theory, which holds that alternatives to the challenging behaviours will not be used unless they are reinforced more effectively, and efficiently than the challenging behaviours. It follows that for maintenance to occur there must be naturally occurring contingencies of reinforcement that are:

• Accessible. If reinforcement for appropriate behaviours is not accessible then these behaviours will not be used. The above studies suggest that access to reinforcement for appropriate behaviour can be blocked by the challenging behaviour itself. For example the study by Luiselli et al. (1977) where the client’s masturbation in class blocked access to reinforcement of the alternative behaviour of academic work. Also the client may not have the skills to access them, as in the case of the Durand and Carr (1991) study where the children were taught to request help and attention. The effect of the intervention in these cases was to make this naturally occurring reinforcement accessible to the client. However, there may be situations where reinforcement for appropriate behaviour is blocked by obstacles that cannot be removed, for example if the skills needed to access them were too complex for the client to acquire.
• Learnable. The client must be able to learn the contingencies in operation, that is, he/she must learn that a particular response will generate a particular consequence. This may be a problem if the contingencies are subtle or obscure, or if there is a long delay between the behaviour and the delivery of reinforcement. Unfortunately many of the positive consequences of challenging behaviour are immediate and clear cut, for example getting staff attention and escaping demands, but the negative ones may be delayed and have a much less obvious relationship to the challenging behaviour, for example being treated with powerful psychotropic medication, being denied access to community based facilities and being placed in unstimulating institutions (c.f. Emerson 1995).

• Powerful enough to support the alternative behaviours compared with the reinforcer supporting the challenging behaviour. The power of a reinforcer to maintain behaviour seems to be dependent on a number of factors, notably the amount of reinforcement delivered, the delay between response and delivery of reinforcement and the probability of reinforcement being delivered (c.f. Horner and Day 1991; Horner et al. 1990). Naturally occurring reinforcers for appropriate behaviours may therefore need to be of a much greater magnitude than those for the challenging behaviours in order to compensate for any delays in delivery or lower probability of occurrence.

If naturally occurring contingencies of reinforcement are not available or not powerful enough another option could be to change the client’s motivation. A number of studies seem to produce maintenance by changing the client’s motivation so that naturally occurring stimuli become reinforcing or cease to be aversive. This is an area of research that has received very little attention in the behavioural literature, however, recently there has been an increased interest in the determinants of a client’s motivation (c.f. Zigler and Bennett-Gates, 1999) and how this may effect the challenging behaviours (c.f. Reiss and Havercamp 1997; 1999). If we are to get more sustained reductions in challenging behaviours without the need for continued external controls this research area may be important. However, it is not clear how much potential there is for changing people’s motivation and it may turn out to be limited.

It therefore seems that although it is sometimes possible to get maintenance in a reduction in challenging behaviour after an intervention has been withdrawn, this is the exception rather than the rule. It has been argued that for this to occur there must be naturally occurring contingencies in place to support the appropriate behaviour. However, even if they are available there may be barriers to people with learning disabilities accessing them. Although it may be possible to change the motivation of some clients so that the available contingencies become effective, this has yet to be demonstrated as a widely effective method. It is therefore likely that the only way a continued reduction in challenging behaviour could be achieved for most people with learning disabilities who show challenging behaviours is by having external controls continually in place. The emphasis therefore should be on getting maintenance with the minimum external controls. Again the current literature on this is sparse. An early paper by Lovaas et
al. (1973) reports on the intensive behaviour treatment of 20 autistic children with behaviour therapy. After treatment some children lived with their parents and some were returned to hospital. When followed up the children who had gone back to hospital had lost the skills they had gained but the ones who had stayed with parents had maintained their skills. The reason suggested for this is that the parents continued treatment. A more recent paper by Bird and Luiselli (2000) reported on the continued treatment of clients whose challenging behaviour had been initially reduced with contingent electric shock. They were able to wean them onto much less restrictive treatment programmes that maintain a low rate of challenging behaviour for 2 years. Further research looking at the long-term maintenance of a minimum necessary amount of treatment would seem to be necessary.

To conclude, maintenance is probably the exception rather than the rule. If naturally occurring contingencies are available that could support the change produced by treatment then the client may need to be put in contact with these contingencies. Here fading seems to be an important method. If such contingencies are not available, then it may be possible to change the client’s motivation, though more research needs to be done to establish how much potential this has for producing a long term reduction in challenging behaviour. Therefore with our current state of knowledge, it seems that for most clients who have been treated for challenging behaviours some form of continued intervention will have to remain in place.

Summary

The literature on the reduction of challenging behaviours in people with learning disabilities is reviewed in order to identify studies in which there was a continued reduction in challenging behaviours after the treatment was withdrawn. It was found that most of the studies that achieved this trained the client in new skills that enabled them to access naturally contingencies of reinforcement. Fading is also used in the majority of studies. It is argued that for maintenance to occur there must be naturally occurring contingencies of reinforcement in place that will support appropriate behaviours rather than challenging behaviours. Although it may be possible to change a client’s motivation so that the contingencies that are available become effective, it is unclear how applicable this is. It is therefore likely that in most cases maintenance of a reduction in challenging behaviours will not occur unless the active treatment remains in place.

References


following restrictive treatment histories. 
*Journal of Behavior Therapy and Experimental Psychiatry*, 31, 5-19


