

SELF-STIMULATORY BEHAVIOUR: APPLICATION OF OVERCORRECTION AND REINFORCEMENT IN A MENTAL HANDICAP CASE

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Over-correction (positive practice or combination of verbal instructions and physical guide) proved to be an effective method for the modification of a mentally handicapped person's behaviour. In this paper, the effectiveness of positive reinforcement for the reduction of the behavioural disorder is also analysed. Reinforcement was administered after a time criterion without behaviour was reached. Treatment was progressively effective, having required initially a complete physical guide, which was replaced by a partial guide and, finally, by verbal instructions. The therapeutic help of a classroom assistant acting as co-therapist during the final phases demonstrated the ease of implementation of the treatment, its good results and its interesting possibilities with regard to applications in schools.

La sobrecorrección (práctica positiva o combinación de instrucciones verbales y guía física), resultó efectiva sobre una conducta autoestimuladora en un sujeto con deficiencia mental. En este trabajo, también se analiza la efectividad del reforzamiento positivo para reducir la conducta alterada, administrado tras cumplir un criterio temporal sin emisión de la misma. El tratamiento fue progresivamente efectivo requiriendo en principio una guía física total, luego parcial y al final bastando con la instrucción verbal. Por último, el apoyo terapéutico de un coterapeuta, auxiliar de un aula, demostró la facilidad de aplicación del tratamiento, sus buenos resultados y las interesantes posibilidades con vista a la terapia aplicada en la escuela.

Overcorrection is a technique for inadequate behaviours reduction that is considered as "benign punishment" (Sulzer, Azaroff and Roy, 1988, p. 385), thereby constituting an interesting alternative to extinction, time-out and other punitive procedures, going back to Foxx and Azrin (1972).

In the clinical psychology domain, two relevant aspects related to overcorrection may be noted. On the one hand, successive initial works oriented to the development of this technique. On the other, the fact that, after the initial interest already mentioned and the proven effectiveness for certain problems, its presence and application seems to diminish, compared to other behavioural procedures.

In relation to the first aspect it could be remarked, as

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Murphy (1978) comments, that, in the early studies, there was no differential consideration of the two component parts of the technique as it is conceived and applied nowadays, that is: restitution and positive practice.

For many authors, interest in this technique lies in what has been called the educational component of overcorrection, that is, positive practice (Foxx and Azrin, 1972; Azrin, Gottlieb, Highart, Wesolowsky and Rahn, 1975; Foxx, 1976; Carey and Bucher, 1981, 1983; Gibbs and Luyben, 1985). However, this feature may be considered as justly criticised since, in some works, it has not been shown that positive practice could be generalised to other situations with conditions different from those of the treatment. In other words, the fact that the target or problem behaviour decreases and that there is repetition of the opposite behaviour, has been confused with the fact that, from that moment on, the subject executes the latter with greater frequency in a spontaneous way. In this sense, according to Murphy (1978), overcorrection

should be considered a non-educational punitive technique with a restitutional part and a practice part, which would be better called required practice, rather than positive practice.

Limitations associated with overcorrection technique affect, most of all, the lack of generalisation to other behaviours different from the problem behaviour (Ollendick, 1981; Matson, Stephens and Smith, 1982) and also the few publications on the topic (Sulzer-Azaroff and Roy, 1988), especially in recent years, even though it is considered an efficient form of treatment and is widely accepted for self-injurious and stereotyped behaviours (Matson, 1993). In fact, there are only 19 references for the term overcorrection in *Psychological Abstracts* over the period 1990-1995.

With regard to stereotyped behaviours, a heated debate is still under way about their aetiology and purpose, while greater attention is paid to self-injurious behaviour, given that it represents a greater danger for the subject.

Without entering into a review of these theories or of the contributions of the different authors, it would be appropriate to mention three groups of explanations about stereotyped behaviours. The first approach underlines the fact that such a behavioural manifestation is maintained by positive (social reinforcement) or negative reinforcement (termination of aversive stimulation) (Carr, 1977; Durand and Carr, 1987; Repp, Felce and Barton, 1988); in other words, they could be considered environmentally controlled forms of behaviour.

A second argument refers to a lack of stimulation, which is compensated by these behavioural productions: this is the self-stimulation hypothesis (Carr, 1977). In this approach may also be included Lovaas, Newson and Hickman's (1987) suggestion of an operant being shaped through perceptual reinforcements (interoceptive and exteroceptive): the perceptual reinforcement hypothesis.

In the third place is the organic hypothesis, according to which there are physiological disorders, in particular, neuronal system disorders (dopaminergic system) (Lewis, Baumeister and Mailman, 1987), or certain brain injuries, as well as some organic aetiology syndromes, that are clearly associated with the production of these behaviours (Matson, 1993).

Repp et al. (1988), in relation to the different hypotheses presented, suggests that, probably, none of them may be applied to every individual, at least not in an exclusive manner. It is more interesting to make a functional analysis which could differentiate the most relevant element or elements intervening, regardless of the way they

fit any of the mentioned theories. In this way, a suitable intervention programme for these behaviours could be developed.

In any case, it is important to emphasise a verifiable fact with respect to stereotyped behaviours: in many of the subjects who present them, their production increases in the most difficult situations, in which something is required or demanded of them, and is not simply a non-sensical repetition of the movement in any situation, as Durand and Carr (1987) already noted.

As regards the application of overcorrection on stereotyped behaviours, it should be pointed out that we are concerned with intervention on the positive practice side, since there is no environment to be restored. This is why, when overcorrection is restricted to positive practice, it may be asked what is the similarity with *habit reversal*, or competence reaction, described by Azrin and Nunn (1987) for *nervous habits* such as twitches, nail-biting, tricotylomania, and so on. In this sense we may refer to Keating and McDonald's (1990) opinion, when they suggest the elimination of the term overcorrection and a change in the terminology of the constituent elements, in order to explicitly specify their characteristics and their suitable application, which they consider to be far from straightforward.

Finally, despite the drawbacks indicated, according to Foxx and Azrin (1974) and Matson (1993), the overcorrection procedure seems to be the most appropriate for intervention in self-stimulatory behaviours manifested by autistic and mentally retarded people, in comparison to other alternatives such as time-out and physical restriction (Foxx and Azrin, 1974; Foxx, 1976; Gorman-Smith and Matson, 1985; Durand and Carr, 1987), differential and incompatible reinforcement, and even punishment (Gorman-Smith and Matson, 1985; Durand and Carr, 1987; Matson, 1993).

In this work, intervention focused on a stereotyped behaviour will be presented, but with the peculiarity that it is made in the school environment during academic activities. Similarly, the possibility of training a co-therapist and the programme's final application in the mentioned domain will be discussed.

METHOD

Subject

Treatment on S.G. -an 18-year-old male diagnosed as profoundly mentally retarded (Terman-Merrill)- was carried out due to his presenting stereotyped behaviour that considerably interfered with his social and school adaptation. Initial demands for intervention came from his class teacher, who observed an extremely iterative behaviour (more than 30 times during the school day)

that impeded the normal development of his activities. In addition, the fact that S.G. was due to leave for another institution justified the decision to therapeutically intervene on this maladapted behaviour, with the aim of facilitating future social interactions.

In the first few contacts with S.G. a level of intelligence higher than that indicated in his 1981 clinical records was shown - a fact which allowed the use of language in the therapeutic process, since he was able to follow verbal instructions, to narrate experiences, to use symbols (the pencil as a microphone), etc.

Situation

In the classroom were a female teacher, two assistants and four pupils, plus S.G., constituting an anomalous class within the school, given the serious behavioural disorders of its pupils.

Target behaviour and assessment

The problem behaviour at which intervention was directed was not the only one shown by S.G., since *balancing* could also be observed, even though this was an occasional rather than continual behaviour. In addition, there were records of some aggressive episodes, though none were observed here.

The most iterative behaviour, and hence the most maladapted in the school context, was that of bringing one or both of his hands to his face, partially or totally covering it, and hiding his eyes at the same time (one of the stereotypes noted by Azrin, Kaplan and Foxx, 1973), or else abruptly turning his head.

In order to more precisely delimit the subtle differences involved in the behaviour in question, five topographies were established.

Topography 1: Both hands, palms extended covering the whole face. Always covering the eyes.

Topography 2: One hand (either one) extended and, vertical or inclined, covering the most part of the face and concealing the eyes.

Topography 3: One hand (either one) in horizontal position and parallel to the table, with the elbow resting on it. This hand made a straight line, whose ends were the thumb and the rest of the fingers, respectively. This hand line was pressed against the eye-brow region, concealing the eyes.

Topography 4: A fist pressed tight to the forehead, with the elbow resting on the table and the face facing the table, or directed at a place opposite to the disturbing source.

Topography 5: A fist pressed against the cheek, concealing part of the face, which was directed downwards (looking at the desk) in an abrupt manner, and clearly distinguishable from the attitude of attending to the task.

In the registration of the mentioned behaviour the num-

ber of times the subject executed the behaviour was considered more relevant than evaluating for how long the position was held.

For the assessment of the behaviour's production, either in observation or intervention stages, the registration of events procedure was used (Sulzer-Azaroff and Roy, 1988).

DESIGN

A complete A-B-A-B design was made in order to test the effectiveness of the treatment. In a first phase, the baseline was established after eight sessions with thirty-two observation periods. Later, treatment was applied over sixteen sessions, followed by a reversion phase and the definitive application of the treatment.

PROCEDURE

Baseline phase

Observation of behaviour and later intervention generally took place in the class environment, and always within the framework of school activities. Some of these activities took place outside the classroom as such, which was considered to be a potential advantage with regard to generalisation of the therapeutic effects.

Baseline was obtained in the classroom through comparison of events registrations made by behavioural analysts, and inter-judge reliability was later established.

Prior to the baseline set-up, non-systematic observations were made in order to accustom the pupils to the presence of observers in the classroom, and to familiarise observers with the peculiarities of the behaviour and check the accuracy of the observations.

Each session in Phase A comprised four five-minute observation periods, separated by two-minute intervals - the time used to work out the reliability of the observations.

The number of observation sessions in the baseline period was eight, with two sessions a week. Chronometers were used for timings.

Treatment phase

Functional analysis made after baseline setting showed that the behaviour observed was an escape behaviour in the face of aversive situations, as Durand and Carr (1987) suggest occurs with some self-stimulatory and self-injurious behaviours. This would explain the considerable oscillations presented by behaviour, which coincide with classroom tasks demands, when attention was required; that is, in situations which were complicated for the subject, resulting in the behaviour in question, which impeded the necessary contact with or concentration on tasks.

In the work of Azrin, Kaplan and Foxx (1973) -where a behaviour similar to the one being studied here was

described- they suggest an application of overcorrection which may not be convenient in this case (large-scale movements opposite to the produced behaviour), due to this subject's reactions to the requirements or to a high level of demands, which became clear from the functional analysis carried out.

It is for this reason that we followed Azrin and Wesolowskys' (1980) line of work, in the sense that procedure should involve the abrupt interruption of subject's behaviour. As in the work of these authors, the subject should remain seated with his hands on the table for a fixed time period. In order to facilitate learning, the possibility was considered of adding reinforcement outside of the specific application of overcorrection.

Thus, after such considerations, the reinforcers to be used during the intervention period were identified. Sweet, fruit flavoured soft drinks and social reinforcers -flattery and praise- were selected as primary reinforcers.

This phase developed in the following manner: each session consisted of five minutes for preparation for intervention, twenty minutes for therapeutic intervention and five minutes for final considerations.

As intervention by a therapist was taking place, the other made a frequency count, whenever the behaviour was executed, with a registration system similar to that used for the baseline. Similarly, the person actively intervening counted SG's responses by changing coins from one pocket to the other. At the end of the session, the reliability rate between the two measures was worked out, as advised by Sulzer-Azaroff and Roy (1988).

The number of intervention sessions in this phase was sixteen, two sessions per week.

Specific application of treatment was based on the use of verbal instructions and physical guidance (Foxx and Azrin, 1974). At the beginning of the session the subject was told not to cover his face (Foxx, 1976). Instructions were given just once, and presented in a brief form (Foxx, 1982).

After instructions, if behaviour appeared, physical guidance was provided, which consisted in removing subject's hands from his face and putting them on the table or on the task; at the same time, the following instruction was given: "No. Don't cover your face". This instruction was spoken in a neutral manner, never as an imperative, to avoid the voice tone becoming a reinforcer (Foxx, 1982). This procedure was valid for any of the topographies of problem behaviour previously mentioned.

Physical guidance was complete at the beginning of treatment. As intervention developed it became partial, up to the point where mere verbal instructions were enough (Foxx, Azrin, 1972, 1974; Foxx, 1976; Foxx, 1982). Thus, it represented a form of training for the

adaptive use of the arms, the limbs participating in the stimulatory behaviour.

A frequency not higher than six productions of behaviour per each five-minute period in which the session was structured, was set as the goal to reach.

Following Carey and Bucher (1981), the possibility of including reinforcement and combining it with overcorrection was considered. In order to accomplish this, an initial one-minute period from the presentation of the instructions was established for obtaining reinforcement. If, within this period, the behaviour was not produced, the subject was reinforced with the above-mentioned reinforcers (15 c.c. of refreshment approx.), or a combination of them with flattery and praise.

If S.G. produced the behaviour, either during the interval or at the moment of receiving reinforcement, reinforcers were removed. Physical guidance with verbal instructions was immediately applied, and another one-minute period began (Foxx, 1982).

Thus, the second criterion for therapeutic success consisted in emitting the behaviour always less than six times with a one-minute period for obtaining reinforcement. Once the requirement was satisfied, and from session eleven onwards, the possibility was considered of increasing this time interval to two minutes, keeping constant the demanded behaviour frequency (less than six). With this criterion, the end of phase B -therapists' treatment- was reached, and the reversion phase began.

Reversion phase

In this phase, the process carried out for establishing the baseline was repeated. Thus, after eight observation sessions, a behavioural trend similar to that observed during phase A was obtained, a fact which finally permitted us to proceed with the intervention.

In the reversion phase, only the therapists were involved with regard to observation of behaviour.

Treatment phase

In this second Phase B, the process previously described was again carried out, and intervention concluded at the end of the academic year. This is the reason why the second Phase B could not be of equal duration to the first Phase B, and follow-up could not be made.

It was in this second Phase B that the co-therapist applied the technique under study.

During the initial phase of the treatment, the co-therapist was instructed in the application of the overcorrection technique. Training consisted of written instructions describing the procedure; verbal explanations were later given.

As regards participation, the therapists' and co-therapist's order of intervention was randomly established, and they only participated actively one at a time. The

object of this arrangement was to establish the reliability of the observations.

Treatment application by the therapists and co-therapist was carried out in exactly the same way as in the initial phase. The number of intervention sessions in which only therapists participated was six, and in which only the co-therapist participated, five, distributed across four weekly sessions.

Finally, two highly relevant facts should be noted concerning the development of this last phase. On the one hand, the inclusion of a pupil who, due to his problematic behaviour, had a decisive influence on the progress of the class and, on the other hand, the end of term, which meant that, as we previously mentioned, the total number of observations could not be completed.

RESULTS

Baseline and first treatment application

The baseline registration for the first phase (see Figure 1) shows that the target behaviour was always present. The maximum frequency registered in one five-minute observation period was twenty observations, and the minimum was one. A visual analysis shows that the most stable trend is located in the five first sessions (20 observations), in which the highest frequency observed was 17 and the lowest 2. The majority of the values are found between frequencies of 5 and 12. Inter-judge reliability in this phase attained values between 0.75, the lowest, and 1, the highest.

As can be observed in Figure 2, application of treatment produced an abrupt decrease in behaviour in the first two sessions (first 8 observations), from then on the production rate remaining lower than six. In session twelve, a slight increase up to five executions took place (Observation 45). (Figure 1).

In this part of the therapeutic intervention only therapists participated, alternating active intervention with the subject and recording of behaviour production.

As previously noted, from session eleven (Observation 44) onwards, the one-minute criterion of reinforcement was changed to two minutes, a fact which did not have any effect on the results, since these were equally satisfactory. In addition, 28 periods in which behaviour was not produced at all were observed, thereby making up three complete sessions -two of them consecutive. The greatest stability of behaviour was found from Session 13 (Observation 52) to Session 16 (Observation 64).

Reliability of observations during treatment application oscillated between 0.85 and 1, the latter being the most frequent value.

With regard to statistical analysis of results, we first proceeded to check the stability of behaviour in the

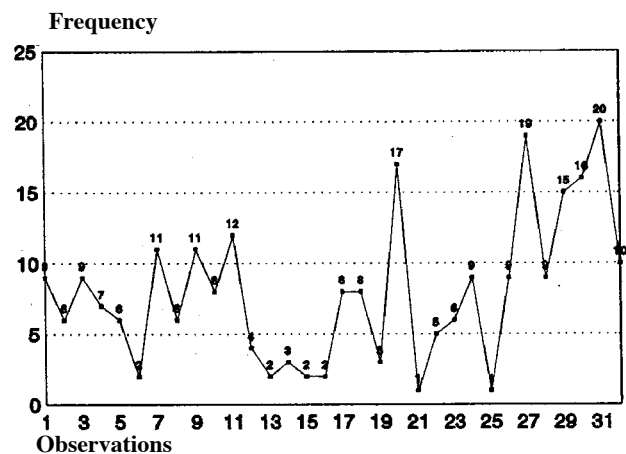


Figure 1: Behaviour frequency observed in Baseline (Phase A1)

baseline and the presence or absence of trends by means of Tryon C's statistic (1982; 1984) for short time series, since only the first treatment phase had more than 50 observations. In the baseline phase (32 observations) a behaviour production mean value of 8 was obtained. The observed Z score is 1.35 ($p < 0.01$), which demonstrate stability within the series, with no trend at all. A comparison between baseline (32 observations) and the first half of the treatment phase (32 observations) was also made. The joint analysis of these series shows a change in trend which may be attributed to treatment ($Z = 4.75$; $p < 0.01$). (Figure 2).

Taking into account the whole first treatment phase (64 observations), behaviour production mean was 1.98.

Reversion phase and final treatment application

Next, a second Phase A (AII) was initiated, with no treatment condition. As can be observed in Figure 3, a gradual recovery of the behaviour was recorded in this phase.

From Session 5 (Observation 20) onwards, the trend is very similar to that observed in the baseline, hence confirming the effectiveness of the treatment. Production frequency oscillated between 11 and 0 (zero), with the latter corresponding to the first sessions. From the fifth session, the maximal stability period in the series, the majority of the values registered are between 10 and 2. Inter-judge reliability in this period reached values between 0.85 and 1.

After recording this data, we proceeded to a statistical analysis of the second AB part of the design, with the final treatment application.

In the reversion phase, AII, (32 observations), a production mean of 4.18 executions of the target behaviour was recorded, as against the 2.38 occurrences of the behaviour in the final treatment phase (44 observations), where therapists' and co-therapist's interventions were randomly distributed. In order to check stability in the reversion phase, we considered Observations 16 to 32,

since it can be clearly seen that the recovery of the behaviour, from that moment on, was not contaminated by the effects of the first treatment phase. Indeed, application of Tryon's (1982; 1984) statistic indicated stability in the series ($Z=0.39$; $p<0.01$). Finally, taking the said 16 observations in the second Phase A (Observations 16 to 32) and the first 32 of the final treatment phase, BII, a change in trend was observed which may be attributed to treatment ($Z=4.78$; $p<0.01$). (Figure 3).

Therapists' and co-therapist's intervention.

As mentioned before, once the reversion phase was finished, therapists' and the co-therapist's participation was distributed for a total of eleven sessions (44 observations) during the final period of the study, which corresponded to the second Phase B of the treatment (see Figure 4).

Therapists' intervention was carried out across six of the total eleven sessions corresponding to the intervention period. In the first of these sessions, at the beginning of Phase B, the rapid decrease in behaviour trend was observed, similar to that in the first application of treatment. Observed values were always lower than six, and the criterion for reinforcement was two minutes, as had been established from the first Phase B. Highest production frequency was 5, and most of the frequencies were between 1 and 3.

The co-therapist's intervention, for a total of five sessions (20 observations), yielded very similar values, except for Session 2 (Observation 6), where a single, quite considerable, increase in the behaviour occurred. The remainder of the intervention fits very well the established criteria. Behaviour production values oscillated between 0 (zero) and 3.

Reliability in this last intervention period oscillated between values of 0.80 and 1 for the agreement between therapists and co-therapist. Analysis of therapists' and co-therapist's series of interventions showed no trend,

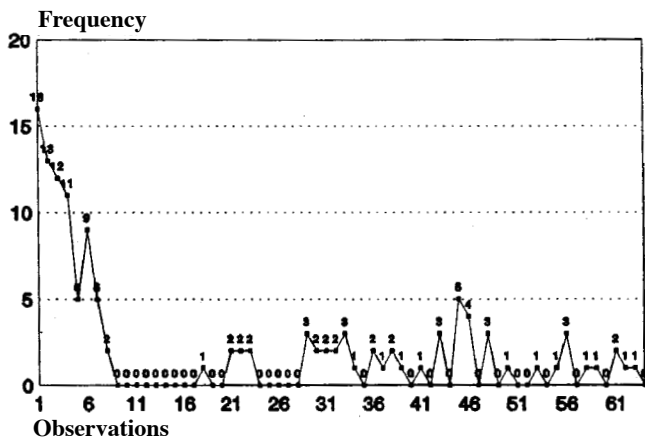


Figure 2. Behaviour frequency observed in Initial Phase of Treatment (Phase B1)

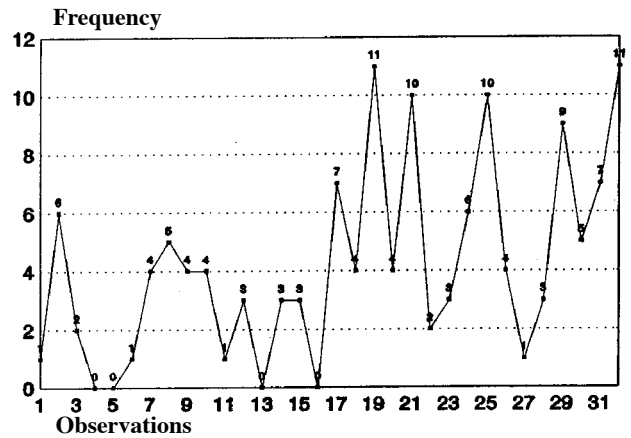


Figure 3. Behaviour frequency observed in Reversion Phase (Phase AII).

but showed stability in the series ($Z=0.2$; $p<0.01$); thus, it is reasonable to think that there are no significant differences between scores obtained by one or the other.

DISCUSSION

The main objective of this study was to verify the effectiveness of the overcorrection technique, and specifically of positive practice, which consists of physical guidance and instructions, in modifying a self-stimulatory behaviour. We also intended to test the performance of a co-therapist in the school environment.

With results obtained from the application of overcorrection technique for a self-stimulatory behaviour, it may be considered and concluded, in accordance with Foxx and Azrin (1974) and Singh et al (1984), that the technique is effective.

It is quite relevant to note the importance of making a suitable functional analysis even with stereotyped behaviour, as Murphy (1978) and Repp et al (1988) comment, avoiding indiscriminate application of overcorrection (and, by extension, of any other technique) on the problem behaviour. In this sense, the established baseli-

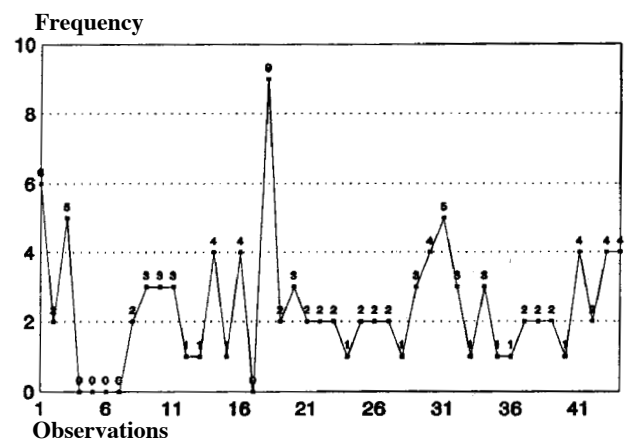


Figure 4. Behaviour frequency observed in Final Treatment Phase (therapists and co-therapists) (Phase BII)

ne showed the connection of response, at least its excessive increase, to the demands of the task and the demands for attention of those in the classroom.

Despite these increases in behaviour production (and, hence, non-homogeneity in its presentation), the objective marked as a success criterion was always maintained, even when the two-minute criterion for reinforcement was applied.

Data registered in the final period provide evidence of effectiveness of the combination administered, that is, verbal instructions and physical guidance, as previously noted by Foxx and Azrin (1972; 1974) and Foxx (1982), with instructions alone becoming determinant once the treatment reaches an advanced level of development (Foxx and Azrin, 1972), and even the partial use of physical guidance ceasing to be necessary.

The most important aspects for treatment effectiveness concern immediacy of overcorrection, as Foxx and Azrin (1972) note, and, most of all, the inclusion of a period with loss of reinforcement, as Foxx (1982) underlines.

According to Azrin, Kaplan and Foxx (1973), Foxx (1982), and Carey and Bucher (1981, 1983), correctly-employed reinforcement, outside of overcorrection itself, is useful; it can even allow generalisation of the required behaviour to other situations if the programme is appropriately established (although there were no records to confirm this in our case). However, although some authors, such as Lenz, Singh and Hewett (1991), suggest that the overcorrection technique is useful and effective when used in isolation or with positive reinforcement, Sisson, Hersen and Van-Hassel (1993) and Sisson, Van-Hassel and Hersen (1993) come up with different results in the two different studies. Thus, in the first case, with two severely mentally handicapped deaf and blind subjects, overcorrection and reinforcement were effective. In the second work, with two subjects with similar characteristics, while reinforcement had no effect, overcorrection and brief physical restriction were effective when jointly applied.

As far as the training of co-therapists and their intervention in the therapy process is concerned, it may be considered as positive and viable, especially in a treatment based on overcorrection, which requires intervention that is constant, but at the same time simple to administer. Moreover, the learning of this technique by the co-therapist did not cause any problems, since it was highly motivating both for its simplicity and its effectiveness.

Moving on to more specific aspects, it is important to note that the mean of the first section of the first phase of treatment is higher than that of the second, which is understandable, since it bears the weight of the baseline and the fall in the response trend.

In relation to this, the significant differences between baseline and reversion may be the result of a clear effect of the first treatment application and of its length. However, there is a recovery towards the end of this reversion phase, with a trend similar to that of the baseline.

As regards final treatment application, the following facts should be underlined:

Firstly, the criterion for obtaining reinforcement was maintained at two minutes for the entire final phase of treatment. This could have become an added difficulty since, in the first Phase B of treatment (BI), this objective was imposed when the subject had already had several sessions with the one-minute criterion.

Secondly, due to organisational factors at the school, the same number of sessions could not be made in the final phase of treatment as in the first; nor could an exhaustive follow-up be carried out.

Thirdly, and perhaps most relevant, the announcement that SG would be leaving the school to go elsewhere, and the tension created by the arrival of a new problematic pupil, should both be taken into account. These factors considerably modified the classroom dynamics, resulting in the re-appearance of the problem behaviour, which can be interpreted as a form of escape (Durand and Carr, 1987). Since the application was made in the school environment, this is the only variable that can be noted as intervening. This emphasises the importance of functional analysis in stereotyped behaviours, as pointed out in the introduction.

However, despite all the inconveniences, the results show that the established criteria were maintained, at least, until the proposed completion of the treatment.

The good results obtained by the co-therapist should also be mentioned, although differences with respect to the therapists were not significant. This is an interesting result, since this person had daily contact with the subject under study and, from the perspective of the intervention, it must be emphasised that he was, as we noted at the beginning, one of the causes of the growth of the problem behaviour.

As a final consideration, it would be interesting to continue studying the subjects to whom overcorrection is applied, apart from traditional studies on autistic and mentally handicapped subjects, where the effectiveness of the technique seems to be already proven (Foxx and Azrin, 1974; Gorman-Smith and Matson, 1985).

Similarly, the possibility of assessing the influence of loss of reinforcement after problem behaviour production in combination with overcorrection should be taken into account, compared to a group of subjects to whom this technique is applied using no reinforcement criterion.

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