

VERBAL AND TOKEN REINFORCEMENT: ELEMENTS OF BEHAVIOUR CONTROL IN A PROBLEM CLASS¹

E. L. Glynn

Education Department,
University of Auckland.

This study examined the effectiveness of teacher verbal reinforcement and token reinforcement plus tangible back-up reinforcers in modifying the on-task behaviour level of both "problem" and "normal" children. Both types of reinforcement produced increases in on-task behaviour, but token reinforcement produced a greater and more consistent increase than did verbal reinforcement, because it proved to be a more practicable reinforcement technique in this particular classroom.

In an earlier study (Glynn and Quinnell 1971) it was observed that in studies employing behaviour modification techniques in classroom settings, two types of reinforcer are typically used. The first is contingent access to events naturally occurring in the classroom (e.g. social reinforcement in the form of teacher approval or disapproval, Becker, Madsen, Arnold and Thomas 1967; Thomas, Becker and Armstrong 1968; Broden, Bruce, Mitchell, Carter and Hall, 1970). The second type of reinforcer is access to more tangible rewards, which do not occur naturally in the classroom setting, but are available in exchange for some contingently applied token (e.g. O'Leary and Becker, 1967; Thomas, Becker and Armstrong, 1970).

Teachers would prefer, on practical grounds, to limit the range of reinforcers to those readily available in the classroom, especially social reinforcement. Nevertheless, the use of tokens plus tangible back-up reinforcers has proved very effective in situations where child behaviour is severely disruptive and where proportion of time spent "on-task" is so low that the child never comes into contact with the range of verbal reinforcement contingencies operating in his classroom. In these situations token reinforcement procedures serve to raise the level of on-task behaviour to a point where the child *can* experience the verbal reinforcement contingencies operating.

Furthermore where there is a large number of children with a low level of on-task behaviour, severe limitations are placed on a teacher's capacity to operate effective verbal reinforcement contingencies.

The following study describes systematic application of verbal reinforcement and token reinforcement in a class in which only six out of 30 children could be regarded as "on-task" for the greater proportion of the time. The remaining children presented a serious problem of control because of yelling out, running and climbing about the classroom and not attending to the lesson.

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METHOD

Subjects and Setting. The class studied was standard two, in a central Auckland primary school, and the study was conducted during written expression time. The class was regarded by teachers as a "problem class", with respect to the extremely high level of disruptive behaviour. Most of the children were regarded as having severe problems, many attributed to deficiencies in the children's home environment—e.g. over anxious parents, and broken marriages. Two groups of children were selected for inclusion in the study—six of the most troublesome behaviour problems, and the six least troublesome, according to the class teacher. These two groups have been labelled "problem" and "normal". The normal group was included to investigate further a previous finding (Glynn and Quinnell 1970) that the success of behaviour modification techniques is not limited to "problem" children.

Dependent Variables. 1. On-task Behaviour. Children's behaviour was classified as either "on task" or "off task" in terms of the lesson characteristics. On-task behaviours were looking at the teacher or the blackboard, taking part in oral discussion directed by the teacher, or writing stories. Any other behaviours were categorised as off-task in this particular lesson (e.g. standing up, moving about the room, playing with objects, throwing objects and banging furniture).

2. Teacher Behaviour. During the first three phases of the study, teacher verbal behaviour was classified as contingent on either on-task or off-task child behaviour. In the fourth phase a record was kept of the number of tokens awarded by a student assistant. Separate data was gathered for the "problem" group and the "normal" group.

Observation Procedures. Two independent observers watched children in a random order for 10-second observation intervals, followed by five-second recording intervals. Each of the children was observed for ten 10-second intervals per half-hour session. Sessions ran every day for eight weeks. Observers were not informed in advance about which children were "problems", nor about the nature and timing of the treatment periods.

Reliability of observation of child behaviour was calculated to provide a similar check on the reliability of observation of teacher behaviour. Data on teacher behaviour, and tokens awarded, were handled by taking the average of the values recorded by each observer.

Design. The design was a two-way repeated-measures one, with each child serving as his own control. The experiment ran in four phases as follows:

Baseline. For 10 days (two school weeks) baseline rates of on-task child behaviour and teacher verbal behaviour were established.

Treatment 1. For the next 10 days, the teacher was shown a daily graph of child and teacher behaviour. Several explanatory talks were given to the teacher on the principles of behaviour modification, and the teacher was instructed to change the contingencies for verbal reinforcement. During baseline, it was established that there was a marked excess of verbal reinforcement for off-task behaviour, except for the last two days. It was discovered that the teacher had learned from an outside source that we were "counting his positive remarks" and

may have been anticipating the treatment phase during the last two baseline days. The object of treatment 1 was to remove this excess of verbal reinforcement for off-task behaviour. As results will show, both the teacher and E were unable to maintain this treatment for 10 days.

Reversal. Following treatment 1, a 10-day reversal period was instituted to provide a measure of control, and to demonstrate to the teacher the effectiveness of the change in tactics. In fact, the teacher proved to have little control over the distribution of his remarks, and was unable to effect the desired reversal.

Treatment 2. As the behaviour of the class had so far proved very difficult to modify through contingent remarks, a token reinforcement system was introduced. An attempt was made to capitalise on a very effective form of extrinsic reinforcement operating in this school, in other classrooms. On performance of near-perfect work for a month, children were permitted individually to accompany the head teacher on a trip to the shops, which involved having milkshakes together. This proved a highly effective motivational system throughout the school, with the exception of the class under study. The level of on-task behaviour in this class was such that no child could ever meet the criterion for reinforcement.

Accordingly, a set of cards ruled into 20 squares was provided. A card was taped to the desk of each child. It was intended that the teacher should move about initialling a square on these cards, whenever a child was seen to be on-task. A completed card would allow the child to approach the head teacher who administered strong social reinforcement and encouraged the child to complete two more cards and thereby qualify for the trip out and the milkshake. However, because the treatment 1 period showed that with the large number of children engaged in disruptive behaviour, it was impossible for the teacher to locate and attend to sufficient on-task behaviour, a student assistant was introduced. She had been present in the classroom several times before treatment 2. It became her task to move continuously about the room, initialling cards of children who were on-task, but avoiding those who might stop working or try to attract her attention. The children were fully informed about the nature and purpose of these cards. Cards were completed at the rate of about one per five observation days.

RESULTS

Reliability of Observations. Throughout the eight weeks of the study, observer agreement was never less than 85 percent, and was typically above 90 percent.

On-task Behaviour. Table 1 presents the mean percentages of on-task behaviour of both "problem" and "normal" children throughout the four phases of the experiment.

TABLE 1
MEAN PERCENTAGE OF ON-TASK BEHAVIOUR

Subjects		Baseline	Treatment 1	Reversal	Treatment 2
"normal" children	01	86	96	80	93
	02	72	69	62	73
	03	96	99	99	98
	04	82	87	60	84
	05	91	99	92	99
	06	89	97	99	97
	\bar{X}	87	91	82	90
"problem" children	07	23	58	40	53
	08	32	45	36	45
	09	33	56	43	71
	10	51	50	38	72
	11	29	44	28	74
	12	44	58	56	88
	\bar{X}	35	52	40	66

Among the "problems" there is a marked improvement in the on-task behaviour level during treatment periods, and a much slighter improvement in the on-task behaviour level of the "normal" children. A two-way repeated measures analysis of variance was carried out on this data, and is reported in table 2.

TABLE 2
REPEATED MEASURES ANALYSIS OF VARIANCE ON PERCENTAGES OF ON-TASK BEHAVIOUR

SOURCE OF VARIATION	SS	df	MS	F
Between Subjects	22,033	11		
A (levels)	18,096	1	18,096	45.96 ***
Subjects within groups	3,937	10	393.7	
Within Subjects	5,513	36		
AB (interaction)	2,796	3	932.0	17.88 ***
B (phases)	1,154	3	384.7	7.38 ***
B x Subjects within groups	1,563	30	52.1	

*** p < 001

Highly significant F ratios were found for the two main effects, namely levels ($p < .001$), phases, ($p < .001$) and for the levels x phases interaction ($p < .001$). From a calculation of omega-squared values (Hays, 1963, p.382) it was estimated that 82 percent of the between-subject variation was due to levels, and that 47 percent of the within subjects variation was due to treatment (phases). The interaction effect was estimated to account for 18 percent of the within-subjects variation.

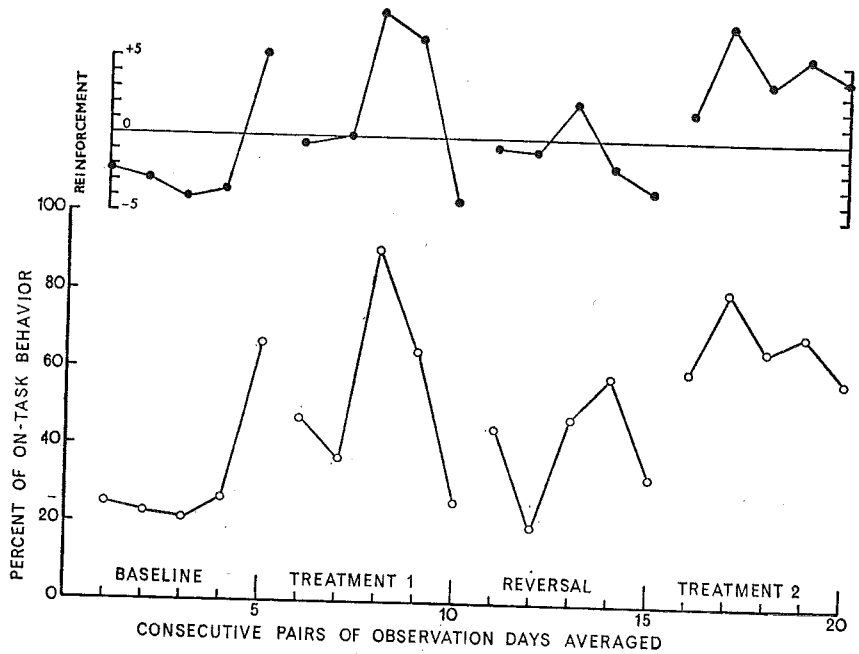


FIGURE 1. Relationship between mean per cent of on-task behaviour of six "problem" children and mean excess of reinforcement for on-task over off-task behaviour for these children.

Figure 1 depicts the percent of on-task behaviour of "problems" over consecutive pairs of observation days throughout the experiment. In the upper graph the mean excess of reinforcement for on-task behaviour over that for off-task behaviour for the problem children is shown. This graph was plotted from the differences between the daily mean number of reinforcements given for on-task and off-task behaviour. Hence, any time the line on this graph reaches above zero indicates a mean excess of reinforcement for on-task behaviour for the problem children.

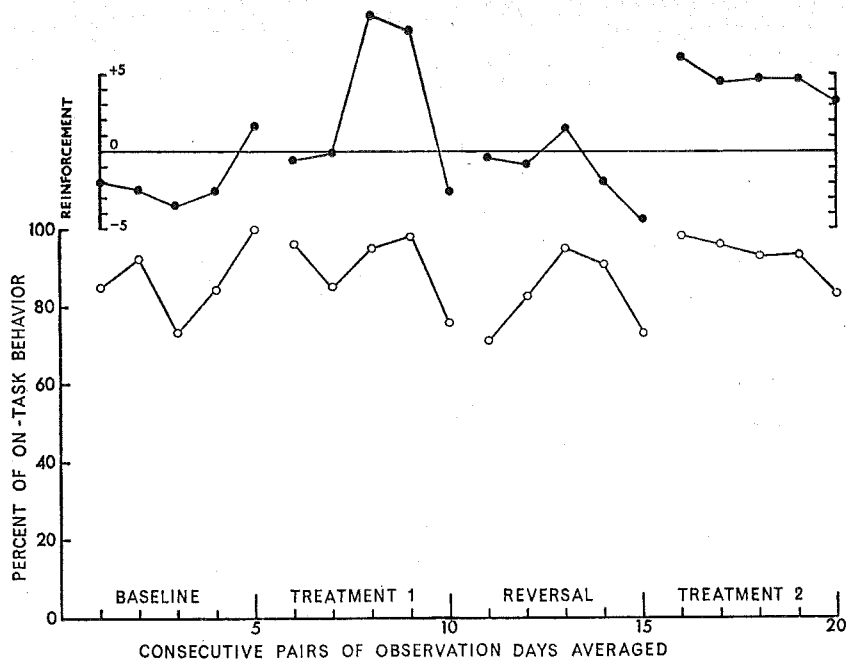


FIGURE 2. Relationship between mean per cent of on-task behaviour of six "normal" children and mean excess of reinforcement for on-task over off-task behaviour for these children.

Figure 2 presents identical data for the "normal" children.

DISCUSSION

1. "Problem" children

(a) Baseline

Figure 1 shows that for the first eight days there was an excess of teacher verbal reinforcement for off-task behaviour, and that for the last two days there was a clear excess of teacher verbal reinforcement for on-task behaviour. There is a remarkable similarity between this line, and the line indicating percent of on-task child behaviour.

(b) Treatment 1

After four days of treatment 1, it was becoming obvious that the teacher was unable to maintain the excess of verbal reinforcement for on-task behaviour that he produced at the end of the baseline. Even though he greatly increased the number of remarks contingent on on-task behaviour, there was an accompanying increase in the number of remarks contingent on off-task behaviour, resulting in only a slight excess for on-task behaviour. The level of on-task behaviour was only a little above baseline level. Thinking the problem was one of the teacher not understanding the nature of the

treatment, the experimenter at this point took over the lesson for four days to model the verbal reinforcement procedure to the teacher, while adhering strictly to the teacher's prepared lesson. However, it soon became obvious that the experimenter could not easily maintain the necessary excess of verbal reinforcement throughout the remainder of the treatment period. In fact the two high points shown on the graph represented a virtually super-human effort of verbal reinforcement, amounting on one day to 90 remarks contingent on on-task behaviour in 30 minutes. Apart from being so exhausting as to be impossible to continue for the rest of the day, the treatment consumed most of the teaching time. For the last two days, the class was handed back to the teacher who certainly could not have been expected to maintain the excess of reinforcement for on-task behaviour demonstrated by the experimenter.

(c) Reversal

Data on teacher verbal reinforcement in Figure 1 indicate that though there was a general excess of reinforcement for off-task behaviour, this excess was not as marked as during baseline. In fact, there was an accidental excess of reinforcement on-task behaviour in the middle of this reversal period. Children's on-task behaviour showed a similar relationship to its treatment 1 and baseline levels.

(d) Treatment 2

This was the first time in the study where an excess of reinforcement for on-task behaviour was maintained for ten consecutive days. This was possible because the student assistant concentrated solely on providing contingent reinforcement, while the teacher concentrated on teaching. Figure 1 shows that on-task behaviour was maintained for two weeks at a level well above that of its baseline.

2. Normal Children

Figure 2 illustrates that there was far less change in level of on-task behaviour among the "normals" than among the "problems". This was expected in view of there being so little "room for improvement" for these children. One striking finding evident in figure 2 is the similarity of the lines depicting mean excess of reinforcement for on-task behaviour and the actual level of on-task behaviour.

3. Verbal reinforcement and token reinforcement

While data indicate that both teacher verbal reinforcement and token reinforcement exerted a controlling influence on the on-task behaviour of the children studied, the verbal reinforcement procedure proved difficult to maintain under the conditions operating in this class, with many children displaying such low levels of on-task behaviour. The introduction of the student assistant greatly reduced the difficulties of maintaining an excess of reinforcement for on-task behaviour, so that more impressive results emerged with the token reinforcement procedure.

4. Effect on children's work

The marked increase in "on task" behaviour reported in this study cannot, in itself, imply improvement in the quality of the children's work, but it can be regarded as the achievement of an important pre-requisite, namely getting children to attend and work at the tasks specified by a given lesson. However, one thing which did emerge from informal observation and from comments of the teacher was that noticeably more children were actually completing the task set during Treatment 2 than during any other period.

5. Possible withdrawal of student assistant

A further treatment condition which could have been introduced were it not for the end of the school year is the gradual withdrawal of the student assistant, so as to leave the teacher with control over reinforcement procedures. This treatment could be introduced in three stages. First, the assistant would be required to couple verbal reinforcement with the marking of cards, contingent on instances of on-task behaviour. Second, the marking of cards would be slowly phased out, with the assistant relying more and more on verbal reinforcement alone. In this way, the assistant's function would become more like that of the teacher. The third stage would require the teacher to begin applying only a small proportion of verbal reinforcement, relative to that applied by the assistant, and to continue increasing this proportion gradually, while the assistant's proportion decreases until the assistant can be withdrawn from the classroom.

REFERENCES

- Becker, W. C., Madsen, C. H., and Arnold, Carole R. The contingent use of teacher attention and praise in reducing classroom behaviour problems. *Journal of Special Education*, 1967, 1, 287-307.
- Broden, Marcia, Bruce, C., Mitchell, Mary Ann, Carter, Virginia, and Hall, R. V. Effects of teacher attention on attending behaviour of two boys at adjacent desks. *Journal of Applied Behaviour Analysis*, 1970, 3, 205-211.
- Glynn, E. L., and Quinnell, Jocelyn Y. Modification of non-task behaviour in the classroom through contingent teacher remarks. *New Zealand Journal of Educational Studies*, 1970, 6(2), 137-150.
- Hays, W. L. *Statistics for Psychologists*, New York: Holt Rinehart and Winston, 1963.
- Miller, L. K., and Schneider, R. The use of a token system in project head start. *Journal of Applied Behaviour Analysis*, 1970, 3, 191-197.
- O'Leary, K. D., and Becker, W. C. Behaviour modification of an adjustment class: a token reinforcement programme. *Exceptional Children*, 1967, 33, 637-642.
- Thomas, D. R., Becker, W. C., and Armstrong, Marianne. Production and elimination of disruptive classroom behaviour by systematically varying teacher's behaviour. *Journal of Applied Behaviour Analysis*, 1968, 1, 35-45.
- Zimmerman, Elaine H., Zimmerman, J., and Russell, C. D. Differential effects of token reinforcement on instruction-following behaviour of retarded students instructed as a group. *Journal of Applied Behaviour Analysis*, 1969, 2, 101-112.