

PRIOR TRAINING AND SELF REINFORCEMENT IN THE STANDARD TWO CLASSROOM

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In this experiment prior reinforcement experience before the introduction of self-reinforcement was compared with no prior reinforcement experience before the introduction of self-reinforcement, in terms of effect on the level and stability of on-task behaviour and amount of reinforcement taken. Twelve subjects were randomly selected for observation under the prior reinforcement experience condition, and from a second class, twelve subjects under the 'no prior reinforcement experience' condition. In the no reinforcement experience condition, self-reinforcement procedures resulted in a stable increase in the level of on-task behaviour. This remained in evidence during a withdrawal of reinforcement phase. In the no prior reinforcement experience condition, there was also an increase in level of on-task behaviour. During the withdrawal of reinforcement phase, however, the behaviour of this class returned to its baseline level.

Mahoney (1972) considers the terms "self-control", "self-management of contingencies", "self-regulation", "self-reinforcement", and "self-directed learning" are interchangeable. The terms each have in common the principle that the individual is participating in the management of his own behaviour. Bandura (1969) regards self-reinforcement as a description of the mechanism by which the individual controls his behaviour at least partially independent of the environment and as the individual's capacity to tolerate the temptation to reward himself when conflicting patterns of external contingencies exist.

Bandura and Perloff (1967) and Glynn, Thomas and Shee (1973) suggest that the self-reinforcement procedure involves a number of components:

1. Specification of behavioural criteria.
2. Self-evaluation. The individual may examine his own behaviour and decide whether or not he has performed a specific behaviour or class of behaviours.
3. Self-recording. The individual may objectively record the frequency of his performance of a given behaviour or class of behaviours.
4. Self-determination of reinforcement. The individual may determine from all available reinforcers the nature and amount of reinforcement he should receive contingent upon his performance of a given behaviour or class of behaviours.
5. Self-administration of reinforcement. The individual dispenses his own reinforcement (which may or may not be self-determined) contingent upon his performance of a given behaviour or class of behaviours.

Recent studies of self-reinforcement procedures in classroom settings (Kaufman and O'Leary, 1972; Drabman, Spitalnik and O'Leary, 1973;

Glynn, Thomas and Shee, 1973) all provide evidence for the effectiveness of these procedures when introduced following a period of prior reinforcement experience involving external reinforcement procedures.

The question of whether such prior reinforcement experience with external reinforcement is a necessary requirement for the successful introduction of self-reinforcement procedures was examined by Glynn and Thomas (1973). This study reported a small but unstable increase in on-task behaviour when self-reinforcement procedures were introduced directly. However, these results were confounded due to there being frequent and inconsistent changes in teacher specification of on-task behaviour for the children, there was a high and stable increase in on-task behaviour. Because of the addition of the cueing procedure after the unstable effects and the first self-control phase, this study was not completely convincing as a demonstration of the immediate effectiveness of self-reinforcement when introduced without prior reinforcement experience.

One aim of this present study was to provide a further examination of self-reinforcement procedures introduced directly, by comparing the performance of two separate classes, one having prior experience of external reinforcement, the other having no such prior experience. A second aim of this study was to examine the behaviour maintenance effects of self-reinforcement procedures following withdrawal of back-up reinforcers.

METHOD

Subjects and Setting

This study took place in two standard two classrooms. Each classroom was in a separate school to avoid possible confounding effects due to communication among subjects when both control and experimental classrooms are in the same school. From each classroom 12 target children were selected randomly for observation purposes. There were 28 children in the first class and 35 in the second class.

One class (Class A) underwent the various treatment phases involved in the prior reinforcement experience before the introduction of the self-reinforcement procedure. The other class (Class B) underwent no prior reinforcement experience before the introduction of self-reinforcement.

Observations were conducted in both schools at 9.00 to 9.30 each school day for 40 days. The lesson in both schools took the form of an oral discussion conducted by the teacher, a five-minute talk by one of the pupils, followed by individual written work, which required children to write a story about the topic introduced by the teacher.

Measures

On-task behaviour was defined as any behaviour which was specifically called for by the teacher including remaining in seats, doing the work set, or quietly reading a book after completion of work. The

daily on-task behaviour score was the percentage of 10-second observation intervals in which an individual child's behaviour was classified as on-task. For an interval to be classified on-task, the target child's behaviour had to be observed as on-task for the entire 10 seconds.

Variability of on-task behaviour was measured in terms of standard deviations of on-task behaviour of each class in each phase of the experiment.

Accuracy of reinforcement was examined by comparing the mean percentage of on-task behaviour of each child with the mean percentage of reinforcement taken by the child in the self-reinforcement phase. While not permitting an exact statement about the accuracy of a child's self reinforcement, this measure at least made it possible to see whether or not the children "maximized" (took more of the available reinforcers than indicated by their level of on-task behaviour).

Observation Procedure

Four observers, two of whom had a knowledge of behaviour modification techniques, were used in the experiment. Two of these individuals observed behaviour in Class A while the other two observed behaviour in Class B. Each observer was equipped with a recording sheet bearing the names of 12 target children. One observation timer (Glynn and Tuck, 1973) was provided for each pair of observers. This timer allowed the observers to work simultaneously, though independently. All observers were naive about the design of the study. Each teacher was informed only of the part of the study which occurred in his classroom.

All observers went into the classroom three times prior to baseline to give the observers an opportunity to practise observing and recording each child's behaviour. When formal observations began, the names of the 12 target children were recorded in a different random order each day. Observers watched the first child on their list for 10 seconds, and then recorded this behaviour as either 'on-task' or 'off-task' during the next 5 seconds. Then they observed the next child on their list for 10 seconds, and recorded his behaviour in the ensuing 5 seconds. In this way, all 12 children were observed once every 3 minutes, and ten times during the half-hour observation session. There were two observers present in at least five out of the eight days in each phase in both classes.

Phase 1 Class A: Baseline 1; Class B: Baseline

During the baseline phase, both classes were observed according to the above procedures to obtain measures of level and variability of the target children's on-task behaviour.

Phase 2 Class A: Treatment 1; Class B: Baseline

At the end of this first phase the principles of reinforcement were discussed with the teacher of Class A. The teacher was instructed to cease making verbal remarks contingent on inappropriate behaviour.

TABLE 1

	Phase I	Phase II	Phase III	Phase IV	Phase V
Class A	Baseline	Treatment	Treatment 2	Treatment 3	Withdrawal
Class B	Baseline	Baseline	Baseline	Treatment 3	Withdrawal

Each child in Class A was given his own token card which remained his exclusive property. When the teacher commented on a child's appropriate behaviour he initialled the child's card. This constituted one token point. There was provision for a child to receive up to 10 points per daily session. The cards were taken up by the teacher at the end of each week and the total number of token points calculated. A list of possible reinforcing activities was drawn up in consultation with the head teachers of the schools and each subject was asked before the experiment to select the activity he/she liked most. Such activities included softball, volleyball, tennis and art work.

The points earned by the children in an experimental session were exchanged at the end of a week for a corresponding amount of time at the chosen activity. For example, if a child earned the maximum number of token points per week during the running of the experiment he was given the opportunity to take part in his chosen activity for the maximum time available (20 minutes) if he earned only half the possible number of points then half the activity time was made available to him.

At the beginning of this phase the teacher in Class A informed the children of the standards of behaviour expected of them by displaying a chart with the printed criteria. This was clearly visible to all the children every day of this treatment phase. The chart contained the following instructions:

1. Sit at your desks—Don't get out of them unless you have asked the teacher.
2. Do the work set by the teacher. Don't fidget or play with pencils, rulers or pieces of paper.
3. Don't talk to or annoy your neighbours.
4. If you finish your work, read a book quietly.

The teacher reminded the children of these standards each day and answered any questions the children had about the tokens and criteria.

Every day of this treatment phase the teacher explained the token system to the children using this format: "The points I give you will allow you to take part in your chosen activity at the end of the week. If you receive ten points from me, this will allow you to have the full time available for your chosen activity. If you have five points this will allow you only half the time for your chosen activity."

During Phase 2, Baseline conditions were continued in Class B.

Phase 3 Class A: Treatment 2; Class B: Baseline

The "standards chart" referred to in Treatment One remained conspicuously placed and the same daily procedures relating to it were performed. A tape-recorder which emitted "Beeps" on a variable-interval schedule was introduced. Intervals between beeps ranged through 1, 2, 3 and 4 minutes. The teacher explained that when a beep occurred the children could award themselves a point if they were "on-task" at that moment. The criteria for on-task behaviour were displayed on the chart. The children recorded their point by marking a mark on their token cards. The cards contained spaces corresponding to ten beeps, for each session.

When the beep sounded, if the children did not consider they were on-task, according to the chart, they were instructed not to give themselves any points. If the children could not decide whether they should have given themselves a point the teacher assisted in the decision-making through the use of statements of deservingness, plus social reinforcement, for example, "That's good Johnny, that deserves a point." Informal notes recorded on observation sheets suggest that this occurred infrequently.

During Phase 3, Baseline conditions were continued in Class B.

Phase 4 Class A: Treatment 3; Class B: Treatment 3

Use of the tape-recorder was continued in Phase 4 for Class A, and introduced in Class B. However, in this phase no verbal instructions, teacher social reinforcement or specification chart, or teacher assistance with decision-making were available for the children in either class.

The children were given the following information each day of this phase. "When you each hear the beeps from the tape-recorder you can give yourselves 0 or 1 point. You will decide whether you should give yourself 0 or 1 point for working at the time the beep goes. I will give you no help in deciding whether you should give yourself 0 or 1 point." In both classes the teachers read each day a statement about the token system and the back-up reinforcers. "The points you earn will allow you to take part in your chosen activity at the end of the week. If you earn 10 points you will have the full time available at your chosen activity. If you earn five points this will allow you only half the time for your chosen activity."

Phase 5 Class A: Withdrawal; Class B: Withdrawal

A withdrawal phase was carried out in both classes to test the generalization effects of self-reinforcement procedures following the two prior treatment conditions. All token and teacher social reinforcement programmes ceased, including the back-up reinforcing activities.

RESULTS

Observer Reliability

Mean inter-observer agreements were calculated for each phase in both classes by determining the percentage of intervals in which observers agreed on the recording of on-task and off-task behaviours. Inter-observer agreements throughout the thirty-two days of the study varied from 91 to 100 percent. This excluded the three days "acclimatization" period, when the reliabilities were 88, 93, and 92 percent.

Level of On-Task Behaviour

Figure 1 shows that Class A increased its level of on-task behaviour in Phase 2 over Phase 1, made a further increase in Phase 3, maintained this in Phase 4 and dropped only slightly in Phase 5. However, it is clear that the level of on-task behaviour displayed in Phase 5 was superior to that in Phase 1. Figure 1 also shows that Class B increased its level of on-task behaviour in Phase 3. An increase in Phase 4 was followed by a marked decrease in Phase 5. It can be seen that the on-task behaviour in Phase 5 reverted to the level displayed in Baseline One.

Variability of On-Task Behaviour

Table 2 shows that in Class A the highest variability in on-task behaviour occurred in Phase 1 and Phase 2 but this variability decreased dramatically during Phases 3 and 4. This decreased variability

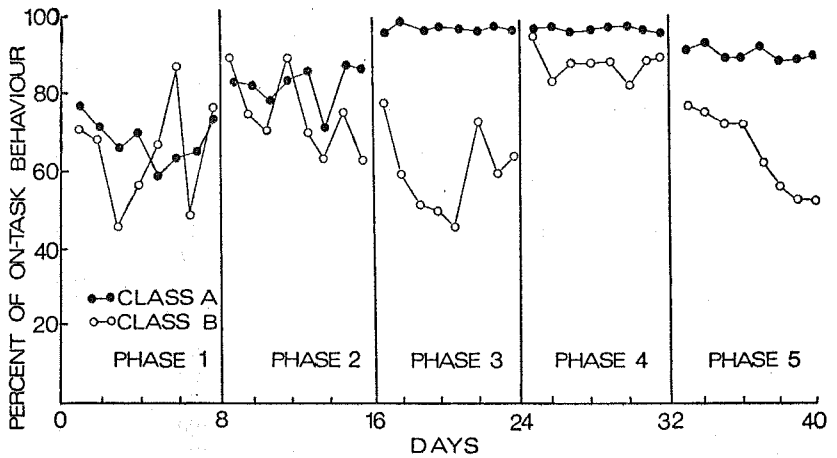


Figure 1. Daily percent of on-task behaviour for the two classes over all phases of the study.

TABLE 2
Means and Standard Deviations of Daily On-Task Behaviour Scores
For Both Classes in All Phases

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Class A	Baseline 1	Treatment 1	Treatment 2	Treatment 3	Withdrawal
Mean Percent	70.09	83.95	98.25	98.26	91.79
S.D.	5.67	5.34	1.08	0.65	1.44
Class B	Baseline 1	Baseline 2	Baseline 3	Treatment 3	Withdrawal
Mean Percent	63.88	74.41	60.94	88.75	62.28
S.D.	13.68	9.91	10.85	3.88	9.56

was maintained during Phase 5. At the same time as variability in Class A decreased in Phases 3 and 4 the highest on-task scores for the five phases were recorded. The on-task score for Class A dropped slightly in Phase 5. These changes in variability can be seen in Figure 1.

Every subject in Class A had an improved on-task score in Phase 3 over Baseline 1 levels, and all subjects without exception were more on-task in Phase 5 than they were at Baseline 1. On the other hand, in Class B subjects on-task scores showed no such improvement and three subjects in Phase 5 obtained on-task scores lower than their Baseline levels.

TABLE 3
Mean Percent of Reinforcement Taken Compared with Mean Percent of On-Task Behaviour for Subjects in each Class (Nearest Whole Number)

Subject	Percent On-Task Behaviour	Percent Reinforcement Taken	Under (-) Over (+) Reinforcement	Percent On-Task Behaviour	Percent Reinforcement Taken	Under (-) Over (+) Reinforcement
A1	100	99	-1	99	97	-2
A2	100	96	-4	99	96	-3
A3	99	90	-10	99	91	-8
A4	97	98	+1	100	100	0
A5	100	96	-4	100	95	-5
A6	100	99	-1	100	90	-4
A7	100	99	-1	100	99	-1
A8	91	98	+7	94	100	+6
A9	99	89	-10	89	89	0
A10	100	99	-1	100	98	-2
A11	100	100	0	100	99	-1
A12	94	95	+1	100	95	-5
B1				81	97	+16
B2				91	96	+5
B3				79	83	+4
B4				91	100	+9
B5				94	95	+1
B6				89	100	+11
B7				69	97	+28
B8				93	100	+7
B9				93	100	+7
B10				100	100	0
B11				89	96	+7
B12				97	100	+3

Amount of Reinforcement Taken

Table 3 shows that although the subjects obtained high on-task behaviour scores in Phase 3 in Class A eight of the twelve subjects scored in the under-reinforcement category (i.e. took less reinforcement than their on-task behaviour score indicated), with another subject taking an amount of reinforcement appropriate to his level of on-task behaviour. Further, in Phase 4, although all the subjects in Class A obtained high on-task behaviour scores, nine of the twelve subjects scored in the under-reinforcement category with the other subjects taking an amount of reinforcement, appropriate to their level of on-task behaviour.

In Phase 4 the subjects in Class B obtained reasonably high on-task behaviour scores though not as high as the scores obtained by subjects in Class A. However, eleven of the twelve subjects have scores in the over-reinforcement category with the remaining subject taking an amount of reinforcement appropriate to this level of on-task behaviour.

DISCUSSION

In this study *both* classes displayed an increase in level and decrease in variability of on-task behaviour with the introduction of the self-reinforcement procedures. In Phase 4, both classes displayed a level of on-task behaviour that was superior to their respective baselines. It would appear that prior reinforcement experience, in accordance with the procedures employed in this study, is not a necessary requirement for the successful operation of self-reinforcement procedures in the classroom. This finding supports similar findings of Glynn and Thomas (1973).

However, when the on-task behaviour level of the two classes in Phase 5 (Withdrawal) is examined there is an interesting difference. Class A continued to display a high and stable level of on-task behaviour throughout the withdrawal period, whereas the on-task behaviour of Class B displayed a steady decrease in level and increases in variability which returned to its Baseline 1 level. The superior performance of Class A during the withdrawal phase can be explained in terms of prior reinforcement experience afforded this Class by the procedures in Phases 2 and 3.

Unfortunately, the design of this study does not allow a clear statement as to whether the superior performance of Class A in Phase 5 can be attributed to the particular type of prior reinforcement experience employed in Phases 2 and 3 (i.e. provision of behaviour specification chart and initial teacher reinforcement of this behaviour) or, more simply to the *amount* of prior reinforcement experience, regardless of how reinforcement was administered. Class A had six weeks, while Class B had two weeks. Two earlier studies indicate that amount of

prior reinforcement experience is a determinant rate of subsequent self-reinforcement (Kanfer, Bradley and Marston, 1962; Kanfer and Marston, 1963).

The finding that "maximizing" of reinforcement was markedly less among subjects from Class A than those from Class B is suggestive that one beneficial effect of prior reinforcement experience under external reinforcement promotes greater accuracy of reinforcement when subjects are given control of the contingencies. These findings are consistent with those of Glynn, Thomas and Shee (1973) which reported a general trend for subjects to take too little rather than too much reinforcement under conditions very similar to those of Class A in the present study.

Reprints may be obtained from H. Jackson at the Department of Education, University of Auckland, Private Bag, Auckland, New Zealand. Data presented in this study are taken from the first author's thesis submitted for the degree of Master of Arts in Education at the University of Auckland.

REFERENCES

- Bandura, A. *Principles of behaviour modification*. New York: Holt, Rinehart and Winston, 1969.
- Bandura, A. and Perloff, B. Relative efficacy of self-monitored and externally imposed reinforcement systems. *Journal of Personality and Social Psychology*, 1967, 7, 111-116.
- Drabman, R. S., Spitalnik, R., and O'Leary, K. D. Teaching self control to disruptive children. *Journal of Abnormal Psychology*, 1973, 82, 10-16.
- Glynn, E. L., Thomas, J. D., and Shee, Seok, M. Behavioural self-control of on-task behaviour in an elementary classroom. *Journal of Applied Behaviour Analysis*, 1973, 6, 105-113.
- Glynn, E. L., and Thomas, J. D. Effect of cueing on self-control of classroom behaviour. *Journal of Applied Behaviour Analysis*, in press.
- Glynn, E. L., and Tuck, D. L. A portable observation timer emitting differential tones for signalling observation and recording intervals. *New Zealand Psychologist*, 1973, 2, 40-42.
- Kanfer, K. F., and O'Leary, K. D. Reward, cost, and self-evaluation procedures for disruptive adolescents in a psychiatric hospital school. *Journal of Applied Behaviour Analysis*, 1972, 5, 293-309.
- Kanfer, R. H., Bradley, M. M., and Marston, A. R. Self-reinforcement as a function of degree of learning. *Psychological Reports*, 1962, 10, 885-886.
- Kanfer, R. H., and Marston, A. R. Determinants of self-reinforcement in human learning. *Journal of Experimental Psychology*, 1963, 66, 245-254.
- Mahoney, M. J. Research issues in self-management. *Behaviour Therapy*, 1972, 3, 45-63.