

reward condition for peers phase.

Of major interest however, was the acceptance of Hypotheses 2 (a) and 2 (b). These were based upon the postulate that the temporal order of the implicit reward condition would be a major determining factor in explaining the disparity between other studies and those conducted by this author. While the application of implicit rewards prior to direct reward conditions (i.e.,  $AB_1B$ ) may constitute an incentive condition for peers and not disturb the reinforcer-power of rewards received by target subjects (Broden, et al., 1970; Werstlein, 1978, lend support to this position: see section 2.3 above), the inclusion of implicit rewards after such a direct reward condition (i.e.,  $ABB_1$ ) has been shown to repeatedly act as an extinction process for both targets and peers. Although not unexpected for peers who are undergoing a typical extinction paradigm during the implicit reward conditions, the discovery that targets also experience an extinction condition has not previously been reported in the wider literature. It appears now quite definite that the presentation of the nil-reward condition of implicit rewards must constitute an extinction condition for peers in order to act as an extinction condition for targets also. That a reward can possess reinforcing powers under one set of temporal-order presentations, and then show extinguishing properties under a separate temporal-order suggests the presence of other factors than those simply inherent in the nature of the reward stimuli themselves. The data gathered in this research strongly suggest the presence of subject evaluations of the reward condition.

## CHAPTER 3

### INTEGRATION

- 8.1 Overview
- 8.2 Summary and interpretation of findings
- 8.3 Limitations of the study and suggestions for future research
- 8.4 Implications for situations in which implicit reward conditions are used

## CHAPTER 8

### INTEGRATION

#### 8.1 Overview

The present studies investigated the incidence of extinctive effects in typical reward situations. The phenomenon of "implicit" rewards was found to produce punishing effects when administered after direct reward conditions, and to have reinforcing effects when presented before direct reward conditions. This variability in the reinforcer-power of typical rewards suggests the presence of powerful mediational processes in children's evaluation of rewards as reinforcers.

The studies used applied behaviour analysis procedures and data were analyzed by methods designed to avoid confusion from serial dependency effects. The issue of unpredicted results from a previous study was examined by developing both literature-based and theoretical postulates into two consecutive studies. Data were collected in multiple time-series designs which enabled high levels of validity and reliability.

#### 8.2 Summary and interpretation of findings

These two studies found similar results to those obtained in an earlier study and designated some conditions under which rewards could act as reinforcers or as punishers. Extinctive effects associated with implicit rewards have been found to be causally related to the temporal order of the implicit reward condition as regards baseline and direct reward conditions. No causal relationship has been found in regard to the variables associated with comparisons involving (i) classroom vs laboratory setting; (ii) teacher vs non-teacher as reward-giver; (iii) age (and moral development) of subjects; (iv) the freedom to talk between trials, or (v) the size of the group. There were effects noted in terms of the power of the extinctive effects in relation to group size, but not in terms of the incidence of the extinctive effects.

The data collected in this research support the suggestion previously made by Premack (1965) that rewards may vary in their reinforcing effects as a result of *situational* factors. In the present studies, there appear to be suggestions of a cognitive evaluation of rewards by subjects. These suggestions lend support to the recently presented view that behaviour-modification procedures need to consider more variables than just stimulus and response factors (Bandura, 1978, 1979; Brewer, 1974).

There is no one theoretical position which fully encompasses the data collected here, and further investigations are necessary before a reliable theoretical statement could be made. What has emerged quite clearly, however, is that the effects noted here have not been previously investigated and that these effects call for a reformulation of some previous ideas regarding the efficacy of rewards as reinforcers. Bandura's (1971, p. 234) caution that it is not possible to determine if implicit rewards will have "rewarding, punishing or extinctive" effects has been removed to some extent by the present research. Certain specific conditions have been shown to possess reinforcing effects (i.e., when implicit rewards are administered before direct rewards) and others to possess extinguishing effects (i.e., when administered after direct rewards).

### 8.3 Limitations of the study and suggestions for future research

As argued in earlier chapters, the present study investigated the effects of implicit rewards under certain conditions. The use of a constant 1:1 reward schedule represents a limitation of these studies and suggests further issues for research. Intermittent schedules may show different results. Likewise, the use of handwriting as the major dependent variable prevents generalization to a wider range of tasks. The application of implicit rewards to a wider variety of (less-sensitive?) tasks may reveal that the effects noted herein are task-specific to some degree. Because of the nature of the task, the experimental setting possessed

typical "classroom" aspects (e.g., children performing an academic skills task, an adult as experimenter, the task being presented in a similar way to other school-based activities), which could be eliminated for future research.

Children's reactions were the focus of this research, but it would be of interest to use teenagers and adults as subjects in future studies. Theoretically (according to Piaget's position noted earlier, pp. 52,53) there should be no difference between the older children used in this study and teenagers or adults. However, the present research did not support Piaget's suggestions as to age differences in moral judgment, and calls for further investigation of this variable.

#### 8.4 Implications for situations in which implicit reward conditions are used

The present research was based upon a typical classroom procedure originally observed by this author when employed as a special education consultant. The use of behaviour modification procedures with children and youth has been widely documented and reported on earlier in this thesis. However, while teachers and other reward-administrators sometimes report that the operant procedures they followed appeared to work "for a time" and then weakened in their effects, it is relevant to question whether implicit reward effects could account for this weakening in effect. It may be that teachers and others actually instigate the direct-implicit reward paradigm investigated herein, and note consequent extinction responses. If this is so, then the effects associated with implicit rewards ought to be taken into consideration when applying behaviour modification procedures with children.

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APPENDIX A

PRELIMINARY STUDIES FOR MAIN STUDY 1

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PRELIMINARY STUDIES FOR MAIN STUDY 1

A.1 Introduction

Prior to hypothesis-testing in Main Study 1 decisions relating to validity and reliability of reward, task and procedure were made on the basis of data collected from four preliminary studies in which these aspects of the planned study were assessed. In order to more clearly show the development of the procedures used in the first main study, these preliminary studies are described below as a sequence.

A.2 Preliminary Study 1

A.21 Task

As suggested in Chapter 4, the task to be used needed to be

- (1) a sensitive indicator of change in motivational state of subject;
- (2) a fine motor-skills task;
- (3) appropriate to age-levels from 5/6 years to 11/12 years;
- (4) preferably be in the form of "permanent products" so as to ensure optimum reliability in scoring.

The task which was used in Sharpley (1978) was considered unsuitable for the following reasons: 1) it represented a typical classroom activity, the inclusion of which may have prevented the "outside classroom" nature of the study from prevailing; 2) because there are many repetitions of each letter in an entire sentence, fatigue may confound results; 3) the task presented superfluous challenges to subjects (e.g., reading, spelling, punctuation) which could contribute to poor letter-writing performance and so confound any extinctive effects due to implicit reward conditions; and 4) the three age groups to be included in the study use different reading and writing standards (e.g., word difficulty, print vs cursive script), thus preventing the same stimulus being used for all groups.

After consultation with a panel of teachers experienced at the grade levels from which subjects were to be drawn, a fine motor-skills activity was designed which was considered to fulfill the five requirements listed above. Combinations of straight lines connected at right angles were drawn. Only lines in length of .5, 1, 3, 5, 10, 20 cm were used, there being one example of 20 cm and two examples of every other length used in each task. The order in which these lines were joined (and therefore the order in which subjects were to perform the task) was chosen by random-selection. No tasks were identical, and there were 30 such tasks generated for inclusion in the actual experiment. An example of a typical task is shown in Figure 15. Subjects were to be asked to "trace the lines from the dot to the X". It was suggested that this task would reflect subjects' response to the reward conditions by measuring the care in executing the tracing.

This study was carried out to verify these suggestions and to test the assumption (made by the panel of teachers) that this task was appropriate to the age levels of subjects.

#### A.22 Reward

The reward used was to be verbal praise plus tokens for free time. Verbal praise has been shown to be a powerful reinforcer of typical school-based tasks with primary aged children (e.g., Becker, Madsen, Arnold & Thomas, 1967; Geis & Clark, 1971; Hall, Lund & Jackson, 1968; Levin & Simmons, 1962; Thomas, Becker & Armstrong, 1968). Tokens based on within-school privileges as rewards have likewise acted as powerful reinforcers of typical tasks such as that chosen for this study (Kazdin, 1975, 1977; Krug, 1974). The actual wording of the verbal praise is described below in the procedure section.

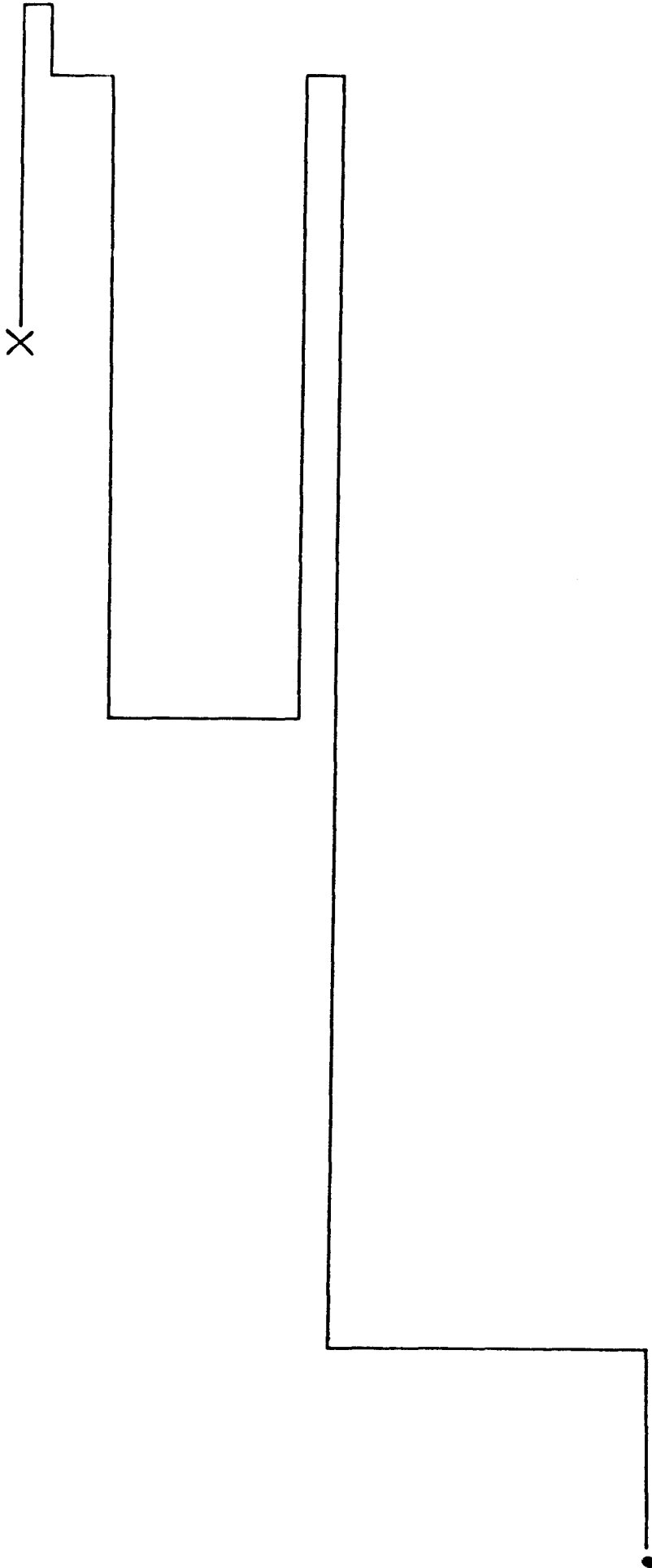


Figure 15: Typical line-tracing task for preliminary study 1

These rewards were used with the co-operation of the teachers from whose classes subjects were drawn.

#### A.23 Subjects

Subjects were chosen from the lower grades (C.A. = 5.0 - 6.0) and upper grades (C.A. = 11.0 - 12.0) of a small primary school. There were no outstanding behavioural/academic problems reported among the children chosen. There was a pool of 16 children in all (eight from the lower grades and eight from the upper grades), and it was planned to include all children in the study. By selecting children from the two extremes of the age-levels to be included in the main study the maximum amount of information was gained from the minimum number of subjects.

#### A.24 Experimenters

Two female postgraduate students in the field of special education were used as experimenters. Both had major studies in psychology and were aged 21 and 25, respectively.

#### A.25 Apparatus

Each experimenter was given appropriate sets of stimulus (task) sheets, tokens for rewards, and written procedural instructions.

#### A.26 Procedure

- (1) The experimenter greeted the child and seated him/her opposite.
- (2) The experimenter then said "I want you to trace some patterns for me please. Make sure you don't turn the paper or take your pen off during the tracing. Here is the first pattern. Start here" (Experimenter points to start).
- (3) After each child completed the first pattern, it was scored by marking as an error every line and corner where the child's traced line left the original and clear space showed between. The score was thus out of a possible maximum of 21.
- (4) Each experimenter then followed the appropriate intervention procedure.

## A.261 Design

The design used was varied to avoid extraneous effects due to fatigue and practice. One experimenter used an ABA design with five trials in the first baseline phase and 10 in the intervention and second baseline phases. The second experimenter used a BA design with 10 trials in each phase.

## A.262 Conditions

A = Baseline (no intervention) During this phase each experimenter asked each child to trace the patterns and then, when the subject had completed each tracing, said "Thank you", marked the tracing, but gave no response to the child.

B = Direct contingent rewards The procedure here was as in A, except that the experimenter told the child his/her score and added the comment "That's better than/worse than/equal to the last one." If the subject's score was better, or a perfect score, the experimenter said "That's very good \_\_\_\_\_. Have a button for some extra play time

## A.263 Experimental procedure: Experimenter 1

A: During Phase A, the experimenter merely presented the tracing and scored it.

B: After trial 5 of A, the experimenter said, "Now I'm going to give you a reward for each one you improve on. The reward will be one of these (shows token). For every one you get you will get one minute extra play time." The experimenter then moved on to the next trial and followed this procedure for 10 trials altogether.

A: After trial 10 of B, the experimenter said "I'm not going to give you any more rewards, but I want you to keep doing the tracings." This continued for 10 trials.

## A.264 Experimenter 2

B: This experimenter began with the procedure of B of Experimenter 1.

A: This was as in the second baseline phase for Experimenter 1.



### A.27 Results

Reliability was assessed by recorection of a random sample of each experimenter's scoring by the alternative experimenter. Interscorer reliability was 100 per cent.

Data collected over the intervention phases were graphed and appear in Figures 16 and 17. It may be noticed that each experimenter changed the number of trials after their first subject so that the original series of  $B = 10$  was changed to  $B = 5$ , as also was the second baseline phase. This was done for two reasons: first, because five trials were found to be sufficient for change to occur from A - B or B - A phases, and second because the projected amount of time taken for each subject (approximately 10 mins.) was being exceeded by an additional 20-35 minutes. The latter factor also cut short the study because the end of the school day had been reached with only three subjects being tested by each experimenter.

Results show a lack of obvious change in response over intervention. Statistical analysis comparing responses from A - B and B - A revealed only one significant change - that of subject 3, Experimenter 1, during B - A phases ( $t = 2.622$ ,  $df = 8$ ,  $p < .05$ ). In itself, this isolated significant result is of little consequence.

### A.28 Discussion

This study was designed to test the sensitivity of the task to variations in motivational state of the subject, to measure the level of choice of co-operation, and to verify the assumption that this task was appropriate to the age levels of the subjects. The reward was also to be tested for its reinforcing power, and the procedure was to be tested for its appropriateness.

The task was shown to be appropriate to both extremes of age-level. Both the grade one and the grade six children were capable of achieving on the task, with no evidence of ceiling effects present. However, there

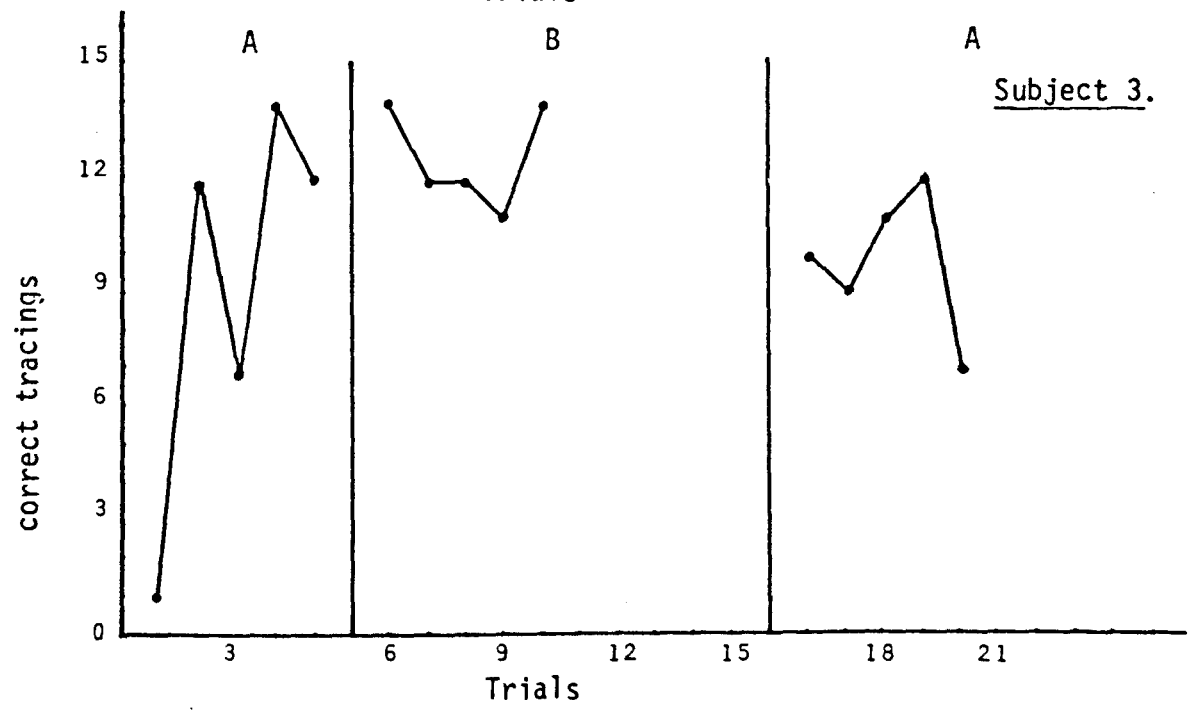
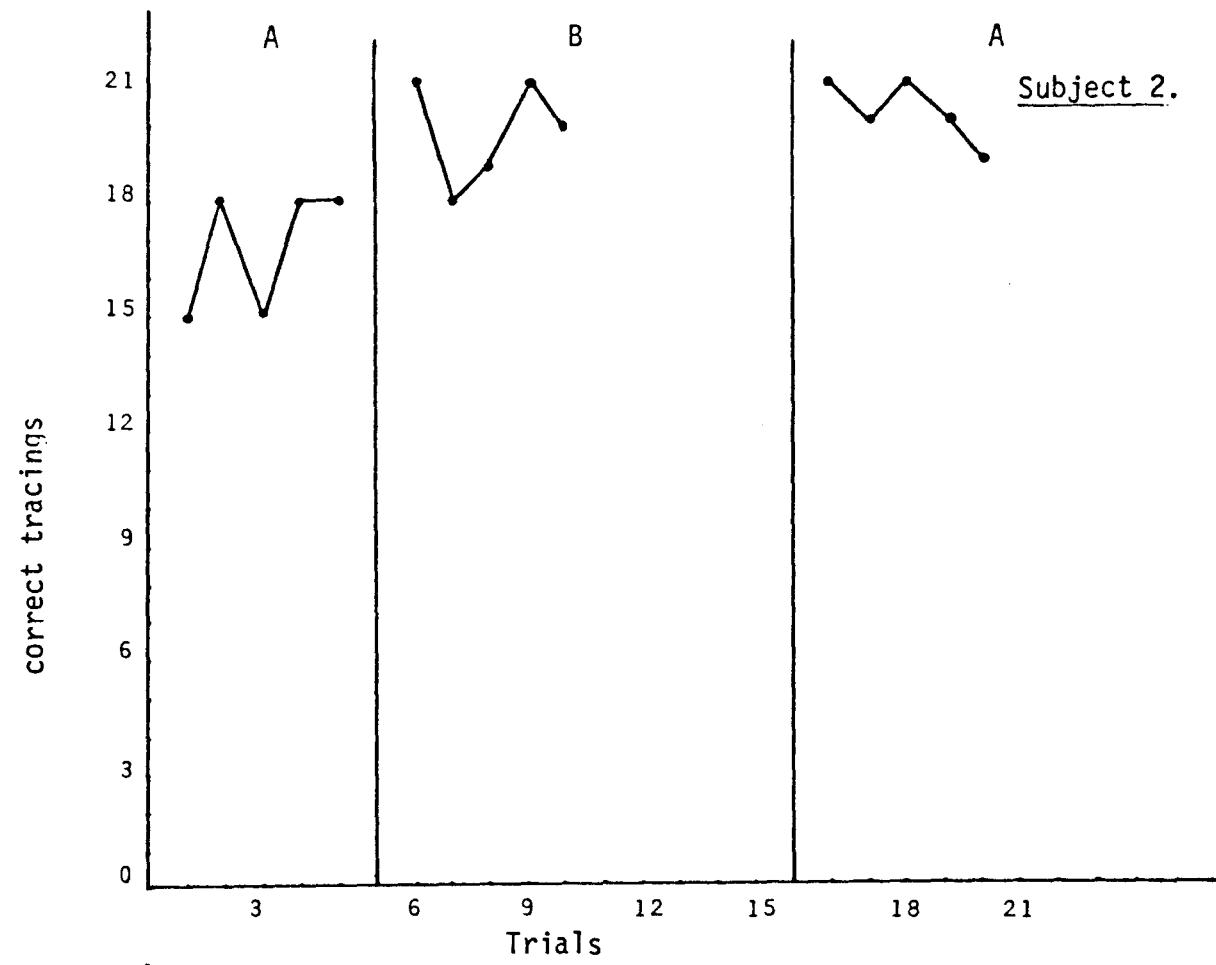
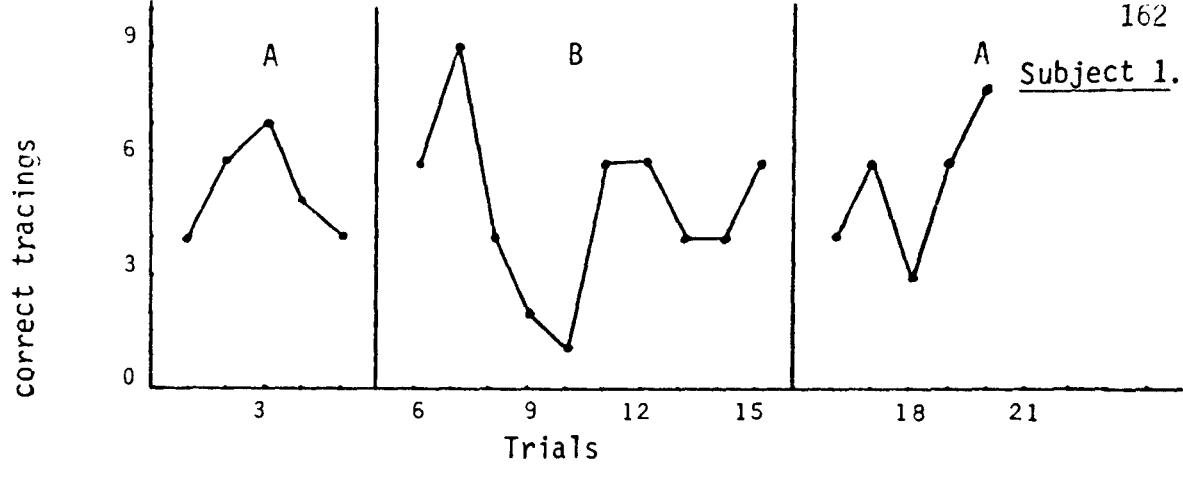


Figure 16 : Subject correct tracing responses, experimenter 1, preliminary stu

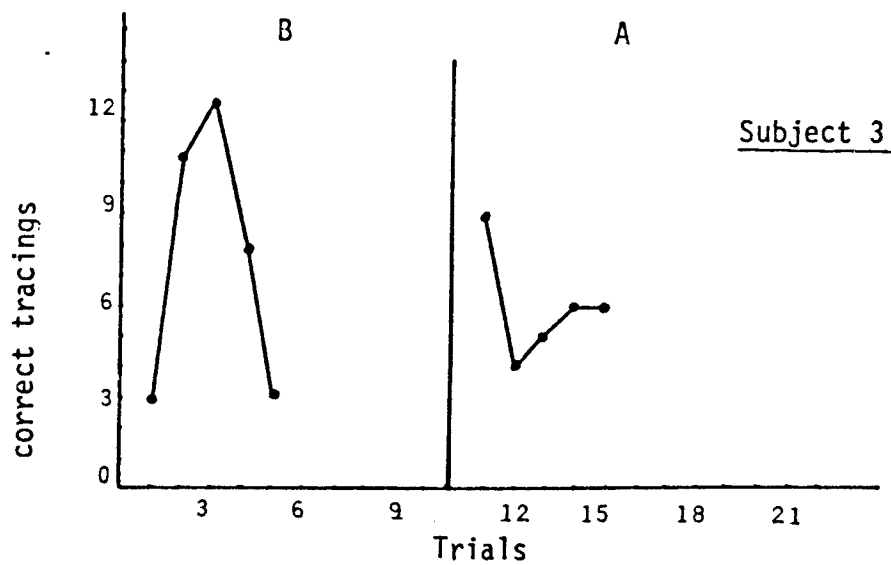
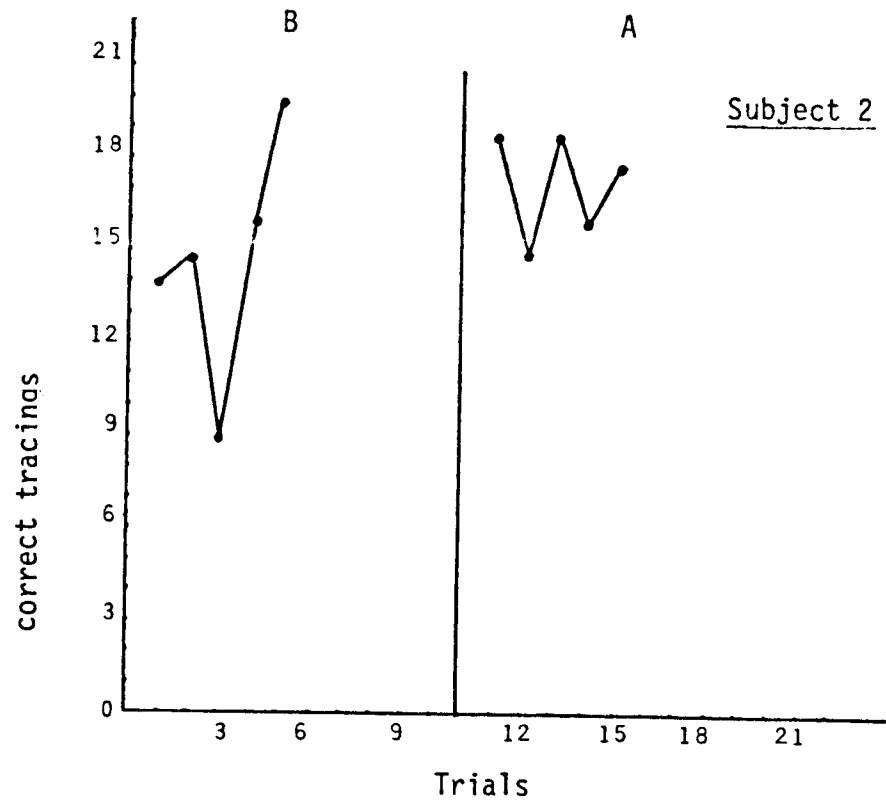
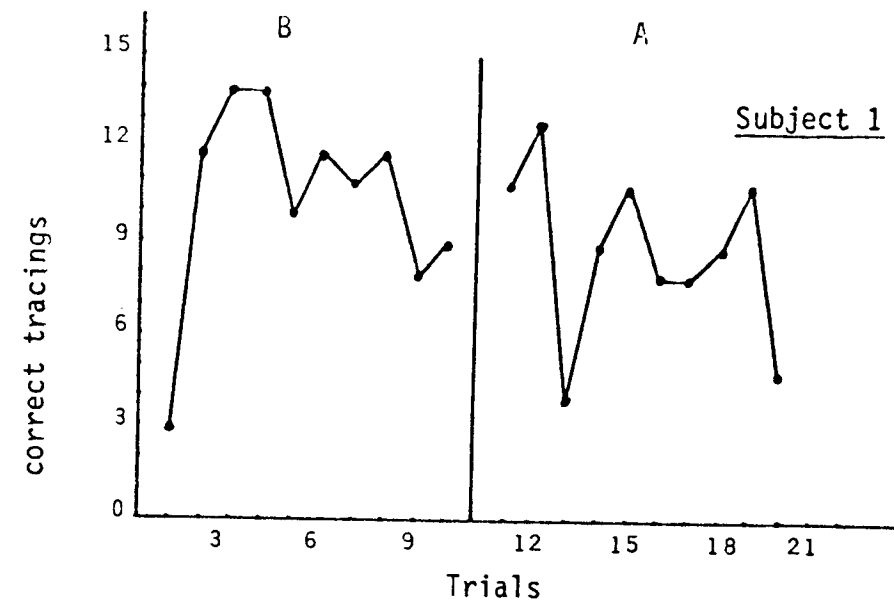


Figure 17: Subject correct tracing responses, experimenter 2, preliminary study

was no evidence of this task being sensitive to changing motivational states of subjects. There were no significant changes in response from baseline to intervention for Experimenter 1 and only one significant change from intervention to baseline for Experimenter 2 (Subject 3). The reward appeared to have little lasting effect upon performance of this task. The procedure seemed satisfactory, except that the task appeared to tire children because of its length. Experimenter-observations and comments suggested that (1) the younger children did not make the logical connection between improvement in scoring and reward, and (2) the feedback of results constituted a reward in itself. A main criticism must be that of length of time - 40-45 minutes is a very long period of concentration for a five-year old.

#### A.29 Conclusion

The present study has ascertained that the experimental procedure used herein is satisfactory, and that the stimulus task is also appropriate in difficulty for the age-levels to be studied. However, this task was not sensitive to changes in reward-structure, either because of the nature of the task itself or because of the lack of reinforcing power of the reward. The time taken by each subject to complete the number of trials necessary to obtain stable data was too long for the children to concentrate. These issues of time of execution, reward-power and task-sensitivity were dealt with in preliminary study 2.

#### A.3 Preliminary study 2

From study 1 the issues of time of execution, reward-power and task-sensitivity arose as major difficulties in the implementation of a task-activity which fulfilled the time requirements (listed below) and which emerged from previous theoretical considerations. This second preliminary study was designed to overcome these difficulties while still remaining within the previously mentioned experimental paradigm (see preliminary study 1).

### A.31 Task

Within the four fold requirements suggested earlier; i.e.,

- (1) a sensitive indicator of change in motivational state of subjects;
- (2) a fine motor-skills task;
- (3) appropriate to age-levels from 5/6 years to 11/12 years;
- (4) preferably be in the form of "permanent products" so as to ensure optimum reliability in scoring,

a new task-activity was devised by a panel of teachers at the relevant grade levels. The task was a choice task in which children were to be asked to choose one of a number of presented mazes for tracing. Correct responses were defined as responses in which subjects chose a maze which had previously been rewarded. From the previous study it was clear that lines of three centimetres were relatively easy to trace by children in the age ranges included. The mazes were therefore constructed from lines of three centimetres length joined at right angles (as in the previous study). Each trial was designed to present the same figure replicated so that the child was faced with a choice between five figures, all the same. Thus the choice aspect of the task was emphasized. Sensitivity to change in motivational state of subject was to be measured by recording the conformity to directions by the subject. That is, it was hypothesized that subjects would take more care when highly motivated. An example of the task is shown in Figure 18. Subjects were to be asked to "trace between the lines from the dot to the X".

### A.32 Reward

As referred to earlier (p. 157) verbal praise has been used as an effective reinforcement of typical school-based tasks. Additionally, it has been suggested that knowledge of results is, in itself a powerful reinforcer (Hanley, 1970; Kazdin, 1977), and this was also used as a reward in the present study.

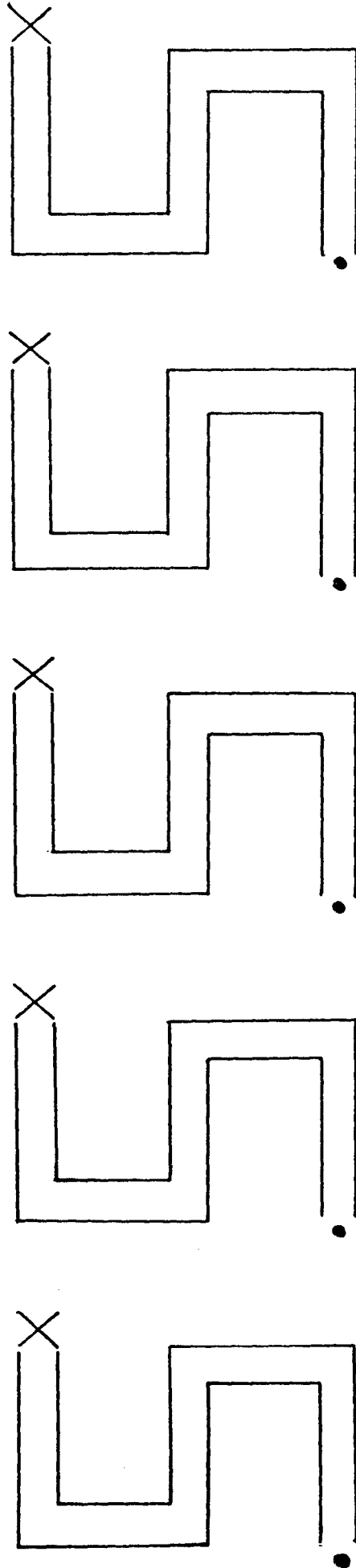


Figure 18: Task activity sheet for preliminary study 2

### A.33 Subjects

The subjects were drawn from the same pool as for preliminary study 1.

### A.34 Experimenter

The experimenter for this study was one male postgraduate student in the field of special education.

### A.35 Apparatus

Task sheets, written instructions.

### A.36 Procedure

- (1) The experimenter greeted the child and seated him/her opposite.
- (2) The experimenter then said "I want you to trace between the lines of one of these drawings for me. Choose any one you like, but be careful not to touch the lines with your pen. Start at the dot here (points) and finish at the X here" (points).
- (3) After each child completed the first pattern it was laid face-up where it was visible to the child and the child was then asked to do the next sheet.
- (4) The appropriate intervention procedure was then followed.

### A.361 Design

The design was of an ABA type with five trials in the first baseline phase (A) ten in the intervention phase (B) and ten in the second baseline phase (A).

### A.362 Conditions

#### A = Baseline (no intervention)

During this phase each child was asked to trace the maze of his/her own choice. The experimenter made no comment except to say "Thank you" after each trial was completed and then presented the next trial by saying, "Here's another one for you."

#### B = Direct contingent rewards

The procedure here was as in A, except that, at the beginning of the first trial in this condition the experimenter picked one of the mazes at

random (providing it had not been chosen by the child in the immediately previous trial, i.e., trial 5 of the baseline phase) and said "This is the correct one now. Each time you choose this one and trace it carefully, you will get a tick. Be careful not to touch the sides with your pen. Choose one now please." If the designated maze was chosen by the child, then the experimenter said "Good. That's right", and ticked the correct choice. This sheet was then laid face upwards so the child could see it while making the next choice.

#### A = Return to baseline

After trial 10 of the B condition, the experimenter said, "You can choose whichever one you like from now on, but I'm not going to tell you if it's correct or give you a tick any more." The experimenter then handed the child the next sheet and 10 more trials were presented under the conditions of the first baseline phase. In order to ascertain the effect of the 'cue' of the experimenter's telling subjects which was the target stimulus, two subjects were not told this information. For these two subjects, the experimenter verbally reinforced the choice of the target-stimulus at trial 6 by saying "That's the right one to choose. Good boy/girl." No comment was made after any choice from trial 16 onwards, except for "Thank you."

#### A.363 Scoring

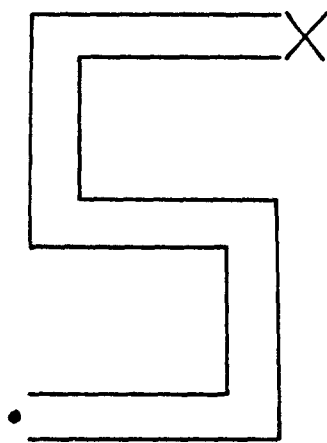
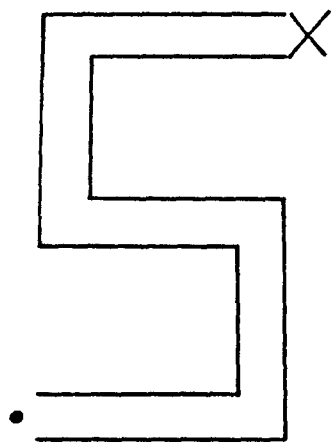
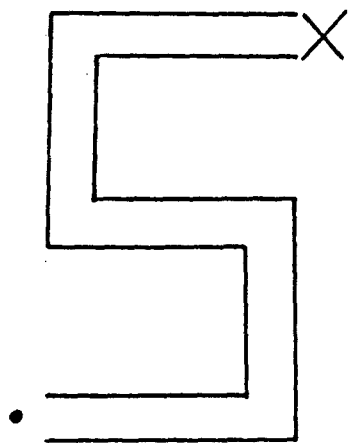
Note was taken of (a) the maze-choice of the subject and (b) the number of parts of the maze drawn correctly (i.e., without touching the sides of the maze). As seen in Figure 19, the maze was divided into four separate right-angle corners. A point was awarded for each maze performed correctly, totalling a possible nine points for a perfect score.

#### A.37 Results

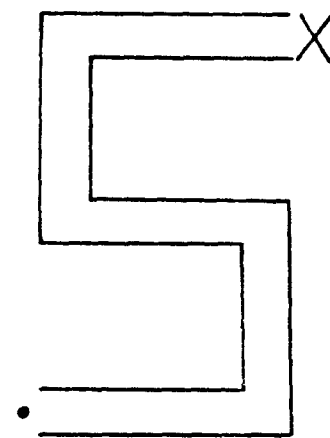
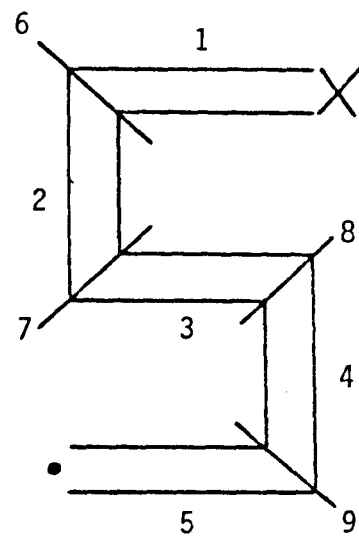
Reliability was assessed by recorection of a random sample of subjects' responses by another experimenter. Interscorer reliability was 100 per cent.

Data were collected over all intervention phases and appear in Table 13.





Scoring Key



Task-sheet

Figure 19 : Scoring procedure for preliminary study 2

Data from preliminary study 2

S	M/F	C.A.	Baseline	Reward - phase	Baseline II
1	F	11.6	10000	1011111111	000000100
2	M	11.9	00000	1111111111	0000010000
3	M	11.9	00000	1111111111	0010001100
*4	M	11.9	00100	1011011111	1111111111
5	M	5.4	00100	0111111111	0010001000
6	F	5.4	00000	1111111111	0000000000
7	F	5.5	10000	0101111110	1000010000
*8	M	6.4	10000	1111111111	1100000010

0 = non-target stimulus choice by S

1 = target choice by S

\*These subjects were not given the verbal cues at trials 6 and 16.

No errors were made in drawing by five of the subjects. Of the three who did make errors, one made two errors of one point, and the other subjects made repeated errors over all phases of between one and three points. These do not represent either a uniform error occurrence or one which is tied to a particular phase. Statistical analysis (t test) of A vs B interventions over all subjects supported the tabular representation of significant change (Table 13), (t = 15.902, *df* = 7, p < .001) for the choice of target-stimulus. Because of the lack of variance apparent in errors in presentation, no further statistical analysis was carried out on these data.

#### A.38 Discussion

With the exception of subject 4, the data collected indicate that there was uniform response to the various intervention conditions as hypothesized. Baseline conditions were accompanied by low rates of response by subjects (approximately equal to chance effects), and reward conditions showed significant increases in response by all subjects. Subject 4 apparently persevered with the choice of the previously-reinforced target-choice during the second baseline phase. For the purposes of this

study, it may be concluded that more precise effects were found when verbal cues were given to subjects than when these were not given.

This study has shown that the task-activity is appropriate in terms of level of difficulty (errors were minimal); time (average time for completion of the 25 trials was eight minutes), and the reward used (baseline vs reward changes were significant). There were, however, some problems regarding the lack of sensitivity of the task. While subjects certainly could have made errors, the present data show little within-subject variance over trials and interventions. Even though the task is open to a score of 0-9, there were few incidences of occurrence or variation in errors. Data such as these do not lend themselves to ready statistical analysis.

#### A.39 Conclusion

Most of the questions raised from preliminary study 1 have been answered by this study. However, another preliminary study was carried out to test the procedure and task in a situation closely paralleled by that designed to be used in the main study, and to determine if the task - activity was sensitive enough to within - subject variation so as to allow statistical analysis.

#### Preliminary Study 3

This study was performed to assess the logistic suitability of the task, reward and procedure in conditions of direct vs implicit rewards, and to collect further data regarding the suitability of the task-activity.

A.41 Task, Reward, Subjects, Experimenter, Apparatus were all as in preliminary study 2.

#### A.42 Procedure

Pairs of subjects were chosen from the pool on the criteria that they had not been included in preliminary study 2.

(1) The experimenter greeted the two children and seated them opposite him at a table. The children were positioned so they could easily see each other's task sheets (see Figure 20).

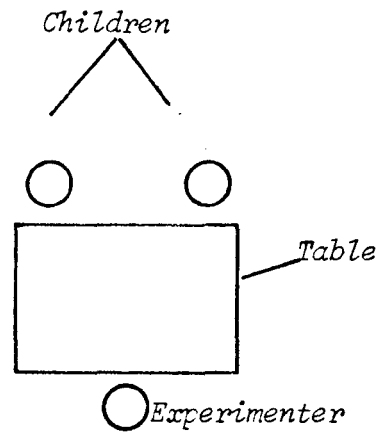


Figure 20: Stimulus presentation conditions, preliminary study 3

(2) The experimenter then said, "I want both of you to trace between the lines of one of these drawings for me. You can each choose whichever one you like— they don't have to be the same one, but be careful not to touch the lines with your pen. Start at the dot here (points) and finish at the X here" (points).

(3) After both children had completed the first pattern these were laid face-up where they were visible to both children.

(4) The appropriate intervention procedure was then followed.

#### A.421 Design

The design was of an  $ABB_1BA$  type, with five trials in the first baseline phase (A), and ten in all following phases.

#### A.422 Conditions

A = Baseline (no intervention)

During this phase each child was asked to trace the maze of his/her own choice. The experimenter made no comment except to say "Thank you"

after each trial was completed and then present the next trial by saying "Here's another one for you".

B = Direct contingent rewards

The procedure here was as in A, except that, at the beginning of the first trial in this condition the experimenter picked one of the mazes at random (providing it had not been chosen by the children in the trial immediately previous, i.e. trial 5 of the Baseline phase) and said, "This is the correct one now. Each time you choose this one and trace it carefully, you will get a tick. Be careful not to touch the sides with your pen. Choose one now please." If the designated maze was chosen by either or both of the children, then the experimenter said "Good. That's right", and drew a tick above the correct choice. This sheet was then laid face upwards so both children could see it while making the next choice.

B<sub>1</sub> = Implicit contingent rewards

After trial 10 of the B condition, the experimenter said to one child "You can choose whichever one you like from now on, but I'm not going to tell you it's correct or give you a tick any more." The experimenter said to the other child "I'm still going to reward you by a tick if you choose the same correct one". That is, the first child (the "peer" subject) was now performing under baseline conditions, and the other child (the "target" subject) was now performing under B--direct contingent reward conditions. This situation is termed "Implicit reward conditions" (see p. 8).

B = Direct contingent rewards

This was a return to the earlier B condition.

A = Baseline

This was a return to the earlier Baseline conditions.

#### A.423 Scoring

Scoring was in preliminary study 2.

#### A.43 Results

Reliability was again assessed by the interscorer method, with results being 100 per cent agreement.

Data were collected over all intervention phases and appear in Table 14. In both pairs it may be noted that the performance of each child markedly increased from baseline to direct reward conditions, indicating that the rewards used were powerful reinforcers for the task-activity. During the implicit reward conditions, both "target" subjects continued to respond to the reward, although the response of the older "target" subject was not parallel to his response during the direct reward conditions (the mean was lower:  $B = 7, B_1 = 6$ ). Both peer subjects lowered their response rate during  $B_1$  conditions, perhaps understandably since this condition was a return to baseline for these subjects. Whether this was merely a non-reward condition, or was actually an aversive condition was answered by a postintervention question which revealed that all subjects had perceived this condition as unfair. (see below).

Performance during the return-to-direct-reward conditions (B) and baseline (A) was almost exactly parallel to performance during the first implementation of these conditions.

The incidence of errors in presentation was minimal, with little variance. After the interventions were completed, a short questionnaire was verbally administered to all subjects. The results of this appear in Table 15.

#### A.44 Discussion

The data collected indicated that there was uniform response to the various intervention conditions as hypothesized. Baseline conditions were accompanied by low rates of response by subjects and direct reward

Table 14

Data from preliminary study 3

S	M/F	C.A.	A	B	B <sub>1</sub>	B	A
*1	M	11.9	- 0 1 0 0 0	- 1 1 0 1 1 1 1 0 0 1	- 1 1 0 1 0 1 0 1 1 0	- 1 0 1 0 1 1 1 0 1 1	- 0 0 0 1 0 1 0 0 0 0
2	M	11.6	- 0 0 1 0 0	- 1 0 1 0 1 1 0 0 0 0	- 0 0 0 0 0 0 0 1 0 1	- 1 1 0 1 0 1 1 0 1 1	- 0 1 0 0 0 0 0 1 0 0
*3	F	5.6	- 1 0 0 0 0	- 1 1 1 1 1 1 1 1 1 1	- 1 1 1 1 1 1 1 1 1 1	- 1 1 1 1 1 1 1 1 1 1	- 1 0 0 1 0 0 0 1 0 0
4	F	5.5	- 0 0 1 0 0	- 1 1 1 1 1 1 1 1 1 1	- 0 1 0 0 0 0 0 0 0 0	- 1 1 1 0 1 1 1 1 1 1	- 0 0 0 0 0 0 1 1 0 0

1 = target stimulus choice by S

0 = non-target choice by S

\* These subjects received direct contingent rewards during B<sub>1</sub> (i.e. they were the "target" subjects)

Table 15

Post-intervention questionnaire and responses : preliminary study 3

Question	Responses			
	Older S's		Younger S's	
	Target	Peer	Target	Peer
1. Did you think this was fair?	Yes	Yes	Yes	Yes
2. Was it fair during B <sub>1</sub> ? (i.e., during implicit rewards)	No	Don't know	No	Yes
3. Why not?	I got too many ticks	?	?	I didn't get any ticks
4. How could it have been fairer?	He got ticks too	?	We both had ticks	
5. Would you like to do it again?	No	No	Yes	Yes



conditions showed increases in response by those subjects receiving them. One slight exception to this was noted for the older target subject who did not perform as highly during and after the implicit reward condition. Post-intervention questioning revealed that this condition was perceived as unfair and the older subjects did not want to repeat the exercise. The younger subjects disagreed about the fairness of the conditions, but appeared to be unhappy with these. There was no within-subject variance on the scoring of the correct drawing of the line. Although the task is suitable in every other needed area, the data collected are in 1 or 0 form, and do not lend themselves to appropriate statistical analyses. The range of possible scores is 0-9 within this task, but no subject scored below 9 on these trials. As an indicator of subject-reaction to reward conditions, this task is not sensitive enough. Because of the lack of within-subject variance and the apparent ceiling effect a further study was carried out with a new task.

#### A.5 Preliminary study 4

##### A.51 Task-activity

This study was carried out to test an alternative task-activity which would be more sensitive to within-subject variance and would provide data more suitable to appropriate statistical analysis. As was discussed in section 5.37, repeated measurements upon individual subjects are able to be validly analysed by time-series analysis to detect changes over interventions. These statistics require data which arise from a task with a range of score possibilities. The task trialled in pilot studies two and three has a range of 0-9, but data collected in these two studies showed little variation from a perfect score of 9. Once again consultation with a panel of teachers who were experienced at the grade levels from which subjects were drawn was carried out. Bearing in mind the four points listed as necessary indicators in preliminary study 1 (p. 156), and the need to replicate the previous study as closely

as possible, handwriting was once again chosen as the task-activity. However, in order to expedite the collection of data, as well as present a task which was of appropriate difficulty level for all age groups, subjects were to be asked to copy the 26 letters of the alphabet only. Also, in order to ensure that the task was suitable for the range of age-groups to be included, printing of lower-case letters was decided upon.

#### A.52 Rewards used

The rewards used previously, i.e., - knowledge of results and verbal praise were once again used. In order to ensure that there would be no danger of the rewards not being powerful as reinforcers for this less-novel task, Smarties<sup>5</sup> were added to knowledge of results and verbal praise. One Smartie was to be awarded for either improvement over the previous trial's performance or for repeated perfect scores (i.e., 26/26).

#### A.53 Subjects and Experimenter

Subjects and Experimenter were as in preliminary study 2.

#### A.54 Apparatus

Children were asked to copy the letters presented by an overhead projection onto sheets of paper with appropriate lines. Ten random presentations of all 26 letters of the alphabet were prepared on overhead transparencies.

#### A.55 Procedure

Three pairs of subjects were chosen from the age groups 5-6, 8-9 and 11-12 from another school not previously used in this research.

(1) The experimenter greeted the children and seated them as in Figure 21.

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<sup>5</sup>"Smartie" is a small chocolate bean (similar to an M & M) which is common in Australia.

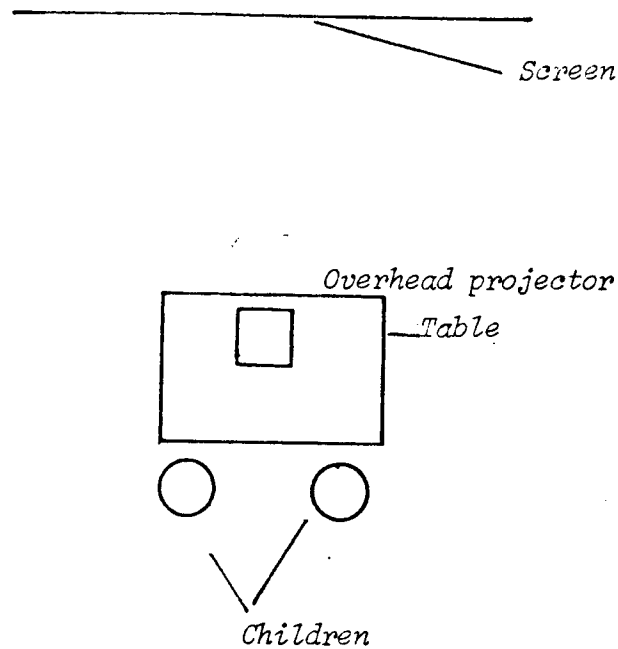


Figure 21: Stimulus presentation conditions, preliminary study 4.

(2) The experimenter then said, "I want you to copy these letters (pointing to screen) for me onto these sheets of paper."

(3) These sheets were then corrected by an experienced teacher outside the room by a method described in detail in section 5.341. During the time it took for correction (about 2-3 minutes), the children were instructed to read silently from library materials. Any questions were politely answered in a noncommittal fashion by the experimenter.

(4) The experimenter then followed the appropriate intervention procedure.

#### A.551 Design

The design used was  $ABB_1B$ , with 8 trials in all phases.

#### A.552 Conditions

These were virtually the same as in preliminary study 3 with the following alterations.

##### A = Baseline (no intervention)

During this phase the children did not receive their writing sheets back following correction.

##### B = Direct contingent rewards

During this phase both children received their writing sheets back with the score marked on it. If an improvement (or perfect score) was noted by a plus sign and a "Smiley" face, the experimenter said "Good work. That's better than before", or "That's another perfect score", and then "Have a Smartie". If there was no improvement (noted by an equals or minus sign and a "Grumpy" face), the experimenter said, "That wasn't better than before. You don't get a Smartie". After perusal of these sheets for about 30 seconds, children were instructed to copy the next set of letters.

#### B<sub>1</sub> = Implicit rewards

During this phase, one child of the pair received treatment B and the other child received treatment A.

#### A.56 Results

Reliability was assessed by another scorer selecting 10 sheets at random and rescoring the 260 letters on them. Interscorer agreement was 94 per cent.

Data were collected over all trials and appear in Figure 22. It is apparent that there was a replication of the results obtained in preliminary study 3 as regards the effects of direct vs implicit rewards. Time-series analysis of these data was carried out and indicated that there were significant increases in level and slope for letters correct from baseline to direct reward condition one for all age groups ( $p < .05$ ). The rewards used thus acted as reinforcers for this task with these subjects.

#### A.57 Discussion

It is of major interest to note that the data obtained from this fourth pilot study indicate that a task-activity has been found which is both sensitive to within-subject variance and also provides data which are able to be statistically analysed by time-series procedures. When this is combined with the testing of subjects, experimenters, apparatus, rewards and procedure, the essential components for a major study designed to incorporate hypothesis-testing are available.

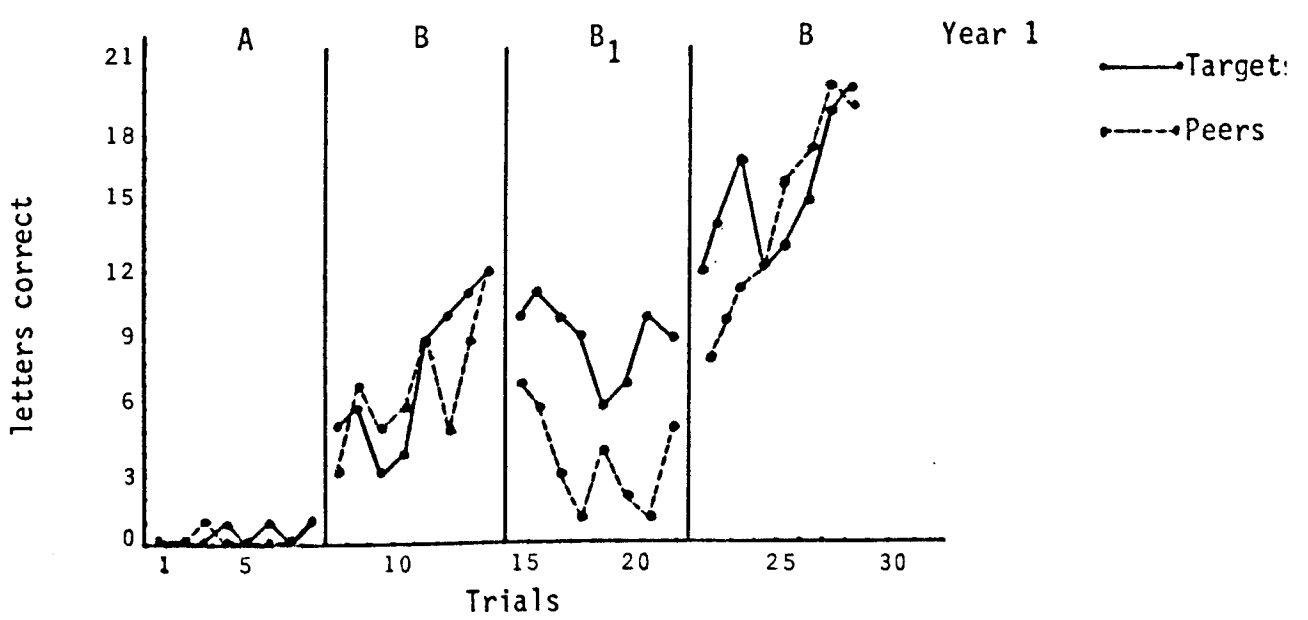
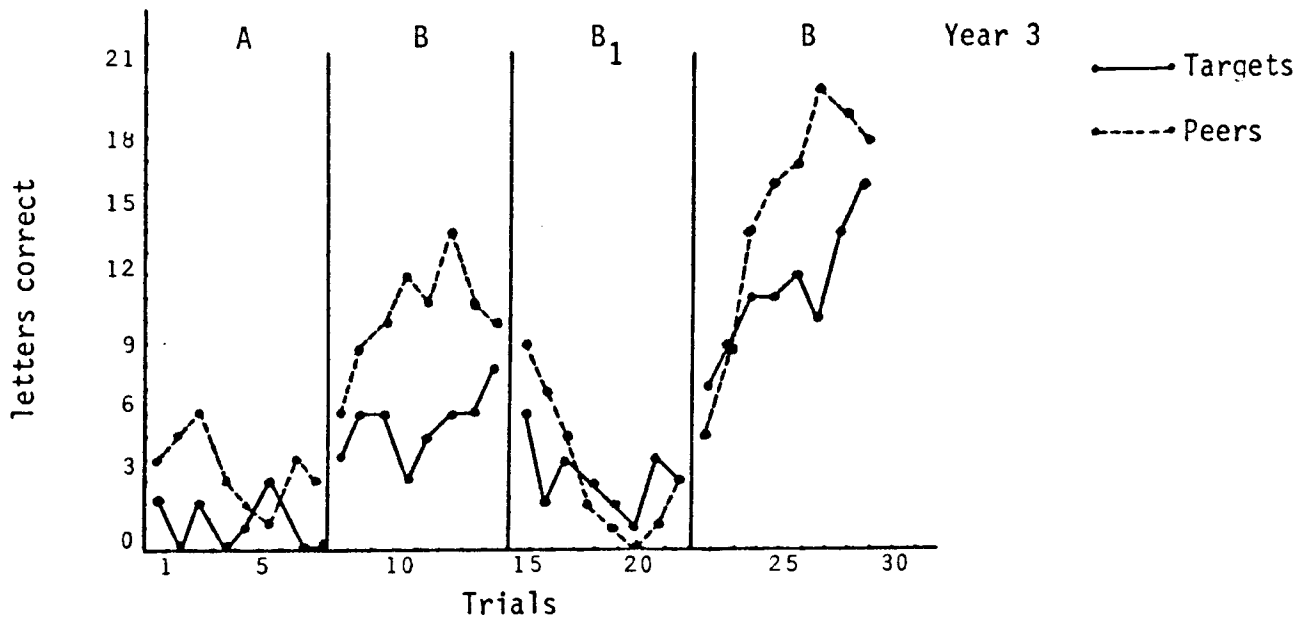
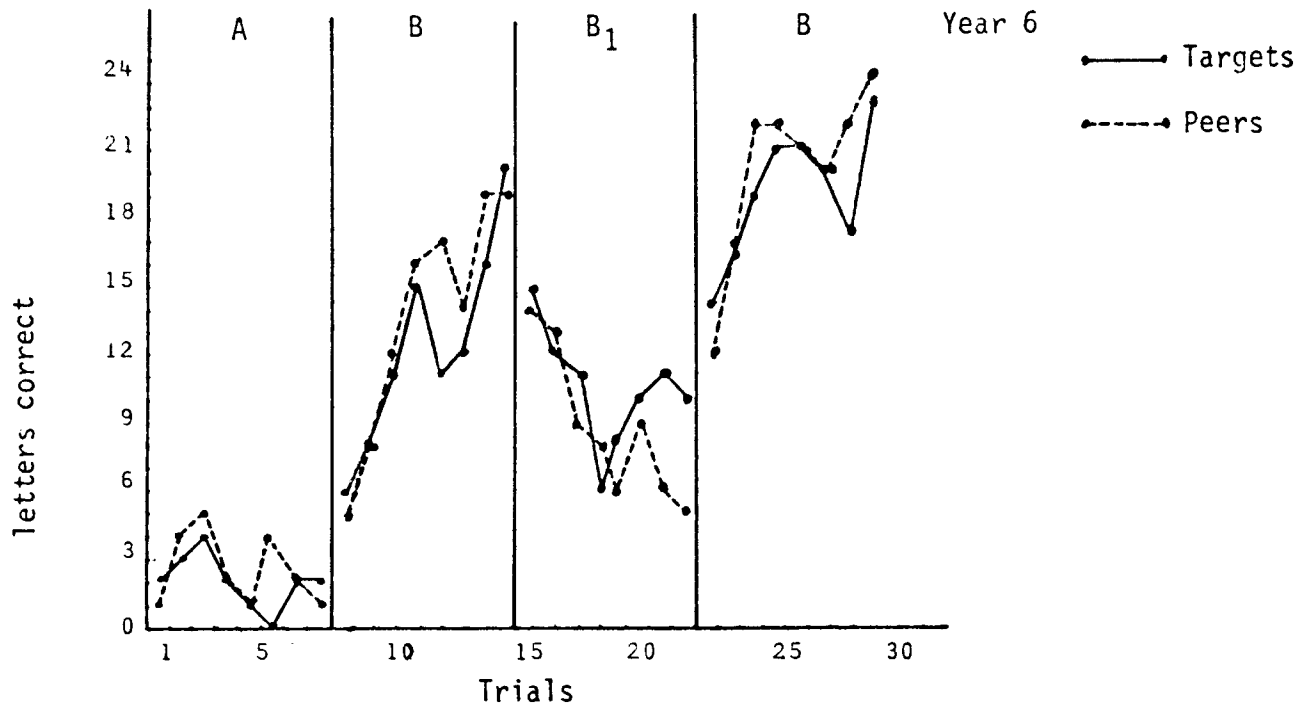


Figure 22: Letters correct over trials, grades 1,3,6, preliminary study 4

APPENDIX B

LETTER MODEL FROM NEW SOUTH WALES EDUCATION  
DEPARTMENT COURSE OF STUDY

l i t

n h r m u j f

c a d g q o e s p b

v w y k x z

APPENDIX C

COPIES OF OVERLAYS FOR EACH GRADE



a b c d e f g

h i j k l m n

o p q r s t u

v w x y z

h j o p r s t u v w x y z

h i j k l m n o p q r s t u v w x y z

z y x w

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

APPENDIX D

QUESTIONNAIRE FOR MAIN STUDY 1

QUESTIONNAIRE

Name:.....

1. Did you enjoy doing this?

a lot

a bit

not much

2. Would you like to do it again?

a lot

a bit

not much

3. Do you think it was fair?

a lot

a bit

not much

4. (If 3. is "not much", then:-)

In what way was it unfair?

\_\_\_\_\_

\_\_\_\_\_

5. Would you like to change it so it would be fair?

yes/no How?

\_\_\_\_\_

\_\_\_\_\_

6. Who do you think made it unfair?

\_\_\_\_\_