

THE REALIZATION AND NON-REALIZATION OF
POSITIVE AND NEGATIVE INCENTIVE SETS,
WITH MENTALLY RETARDED SUBJECTS

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TABLE OF CONTENTS

| Chapter | Page |
|--|------|
| I. INTRODUCTION | 1 |
| II. STATEMENT OF THE PROBLEM | 6 |
| III. EXPERIMENTAL PROCEDURE | 8 |
| A. General Methodology | 8 |
| B. Subjects | 11 |
| C. Apparatus | 11 |
| D. Procedure | 12 |
| IV. RESULTS. | 13 |
| V. DISCUSSION | 26 |
| VI. SUMMARY AND CONCLUSIONS. | 29 |
| VII. REFERENCES | 31 |
| APPENDICES | 34 |
| A. Instructions. | 35 |
| B. Mean Performance Scores | 38 |

LIST OF TABLES

| Table | Page |
|--|------|
| 1. Analysis of Variance of Scores in Warm-up Pre-test Trials 6-10 for the Three Major Set Conditions and the Nine Sub-group Conditions | 15 |
| 2. Analysis of Variance of Scores of the Three Major Set Conditions and the Nine Sub-group Conditions on Trials 11-20 | 16 |
| 3. Analysis of Scores of Sub-groups in Which Set Was Maintained, Realized, and Non-realized on Trials 11-20 | 17 |
| 4. Analysis of Variance of Scores of the Three Major Set Conditions and the Nine Sub-group Conditions on Trials 21-30 | 18 |
| 5. Analysis of Variance of Sub-groups in Which Set Was Maintained, Realized, and Non-realized on Trials 21-30 | 19 |

LIST OF FIGURES

| Figure | Page |
|---|------|
| 1. Mean Performance Scores of Sub-conditions Under Control Set Condition: Sub-groups 1, 2, and 3. | 20 |
| 2. Mean Performance Scores of Sub-conditions Under Positive Incentive Set Condition: Sub-groups 4, 5, and 6 | 21 |
| 3. Mean Performance Scores of Sub-conditions Under Negative Incentive Set Condition: Sub-groups 7, 8, and 9 | 22 |
| 4. Mean Performance Scores of Sub-groups in Which Set Was Maintained. | 23 |
| 5. Mean Performance Scores of Sub-groups in Which Set was Realized. | 24 |
| 6. Mean Performance Scores of Sub-groups in Which Set Was Non-realized. | 25 |

I. INTRODUCTION

During the present century a large number of experiments have appeared in the literature which were concerned with the relationships of motivation. In this regard, Young (1936) has said that "in every situation that vitally concerns human behavior, questions of motivation arise." In partial support of this point of view are studies positively relating incentives to muscular strength (Crowley, 1926), reaction time (Johanson, 1925), and intelligence quotients (Hurlock, 1925). The greatest number of experiments by far have been concerned with relating incentives to learning processes. Since the early work of Hurlock (1925), Sullivan (1927), and Anderson (1924), there has been a long series of experiments seeking the relationship between rewards and punishments and the learning process.

It has been shown that young children learn arithmetic more rapidly if they are publicly praised, and more slowly if they are reproofed or ignored (Hurlock, 1925). Abel (1936) points out that with a learning task, those subjects receiving no incentives learned slower than those receiving a verbal reward. Both groups of subjects learned more slowly than a group receiving a material reward.

Gates and Rissland (1923) have reported that children respond better or more efficiently to "encouragement" than to "discouragement." It seems that a rather consistent result of comparisons of effects of praise and reproof is that praise leads to higher levels and more efficient performance (Hurlock, 1925; Hurlock, 1925; Chase, 1932; Anderson, 1936; Hilgard and Russell, 1950).

Type, amount, and delay of reinforcement have been significantly related to performance (Crespi, 1942). Evidence suggests that response magnitude increases as reward magnitude increases. However, there is some evidence that an incentive may be so large as to disrupt the learning process (Kohler, 1925). As the delay of reward increases, there is evidence that extinction occurs at a more rapid rate.

With animals for subjects, experimenters have reported that incentives differentially affect performance also (Thorndike, 1932; Schier, 1956; Schier and Harlow, 1956). The majority of experiments using animal subjects have sought to investigate some issue of theoretical significance, such as delay and amount of reward. Although the evidence is now inconclusive, it appears that there are few basic differences in the learning processes of normal human and animal subjects.

Studies dealing with punishment have yielded rather inconsistent results. Estes (1944) has pointed out that punishment may serve to prevent learning. When a rat in a Skinner box is consistently punished for incorrect responses, all response may be inhibited after a time. Commins and Fagin (1954) reported that punishment aids learning most effectively when used in conjunction with reward. Thorndike (1932) reported that he was unable to obtain learning in response to negative incentives, when young chicks were used as subjects. In a three-path maze, the chicks were rewarded for entering two of the paths and punished for entering the third path. The subjects eventually showed a distinct tendency to return to the rewarded paths, but there was little evidence that punishment led to any tendency to avoid the path associated with punishment. Estes (1944) suggested that the effects of punishment are often emotional in nature and may disrupt performance, but do not necessarily change the

learning that underlies the performance.

In spite of the great number of experiments concerned with the effects of incentives upon learning, relatively few of these have utilized mentally retarded subjects. One of the early studies that did use retarded subjects was reported by Abel (1938). He investigated the influence of social facilitation on motor performance at different levels of intelligence. Social facilitation occurred when subjects worked in the presence of each other. The conclusion derived from this experiment was that more intelligent subjects tend to profit more from social facilitation than do less intelligent subjects. Gordon, O'Connor, and Tizard (1954) investigated some effects of incentives on the performance of imbeciles on a repetitive task. This study indicated that knowledge of results beneficially influenced the performance of retarded subjects. The authors suggested that knowledge of results served as comprehensible goals, and that these goals were superior to positive incentives as motivators. An incidental finding in this study was that retardates are capable of sustained work to achieve a goal, and that they respond to incentives in much the same way as do normal subjects.

Additional studies of the effects of incentives upon the performance of imbeciles were conducted by O'Connor and Tizard (1954). They discovered that retardates striving for a goal related to their standards of achievement would perform consistently and significantly better than would those who were simply encouraged to do their best. Both of these groups consistently performed better than did a control group that was merely asked to do the task. A second major result was the discovery that for retardates improvement was a function of when the incentives were employed as well as of the incentives themselves. Initial levels of achievement appeared

to be critical determiners of subsequent levels of performance.

In an experiment conducted by Zigler, Hodgen, and Stevenson (1958) normal and retarded subjects were allowed to play games with similar parts until the subjects were satiated. Two conditions of reinforcement were introduced so that half of each group of subjects received no verbal support from the experimenter during their performance, while the other half were given both verbal and non-verbal forms of support. Hypotheses were concerned with the general facilitative effects of support, and the relatively reinforcing effect of support for the mentally retarded subjects. Results indicated no significant differences between normal and retarded subjects under support and non-support conditions. Retarded subjects were found to have been more compliant with the instructions than were normal subjects.

Summarizing data on the proposed experimental variables, it has been found that rewards result in more effective performance in a learning situation than do punishments. Punishments have been reported to be effective when used in conjunction with rewards. Punishment alone may serve to produce a relatively greater variability of performance, or may serve to prevent learning. Differential amounts of incentives lead to variability of response. Delay of reinforcement can affect performance. An incentive may be of such a magnitude as to disrupt performance or learning. It has been shown that retardates can respond to incentives in much the same way as do normal subjects.

As to the realization or non-realization of set or expectancy, a lesser amount of experimental data has been reported. Thorpe (1958) has suggested that expectancies must be reinforced if they are to continue to energize performance. There is some evidence that young children will

perform more efficiently for the promise of a large reward than for the realization of a smaller reward or for verbal praise (Boldt, 1953). Worell (1956) has studied the effect of goal value upon expectancy, and found that the values of an event have some effect upon expectancy. It was also found that expectancies were significantly lower in high value conditions and that the association of a goal value to expectancy leads to more realistic expectancies.

II. STATEMENT OF PROBLEM

In a recent survey of research being conducted in institutions for the mentally retarded (Lipman and Blackman, 1959), it was reported that in a random sample of forty-seven institutions, 74.5 per cent of the institutions were carrying on research activities. A further breakdown of the data indicated that 37 per cent of this research was of a psychological nature, and only 18 per cent dealt with learning problems. In 1948, a survey of the literature (McPherson, 1948) revealed fourteen studies concerned with learning problems in mental deficiency. Ten years later, a second survey (McPherson, 1958) reported sixteen additional studies. In a period of over twenty years, McPherson was able to find only thirty studies reported in the literature concerned with the learning of mental retardates.

One possible explanation for this deficiency of experimentation is the vestigial attitude held by many psychologists, that the retardate will remain a retardate in spite of what is done to or for him. However, it is obvious from the experimental literature that very little attention has been given to the learning process of retardates. The conclusion of McPherson's latter survey contains these statements:

"The ability to learn cannot be identified with that ability known as intelligence...learning of mental defectives is not consistently inferior to that of individuals who achieve normal intellectual ratings."

Federal support in the way of financial aids has served to stimulate research in the area of mental subnormality with considerable emphasis upon learning. Many of these research findings were reported too late to be included in McPherson's surveys. A number of these subsequent studies are

concerned with motivation of learning or the effects of incentives on learning (Seward, 1956; Zigler, Hodgen, and Stevenson, 1958; O'Connor and Tizard, 1954). The general area of motivation, and particularly the study of the effects of different types of incentives upon learning, is apparently beginning to receive considerable experimental attention. The present study is an addition to the experimental evidence gathered in this general area.

The purpose of this study is to investigate the effects of the realization or non-realization of positive or negative incentive sets upon rotary-pursuit performance.

The following null hypotheses were advanced for statistical testing:

1. There exists no statistically significant differences among the performance of subjects in Control Set, Positive Incentive Set, or Negative Incentive Set conditions.
2. There exists no statistically significant differences among the performances of sub-groups in which set is maintained, realized, or non-realized.

III. EXPERIMENTAL PROCEDURE

A. General Methodology

The general procedure of this experiment was to conduct an experiment in rotary-pursuit learning with institutionalized mentally retarded subjects in order to study the effects of positive and negative incentive sets, and the realization or non-realization of these sets.

Ninety mentally retarded subjects were selected from the pupils at Enid State School and were randomly assigned to nine experimental groups of ten subjects each. The nine groups were sub-groups of three general set conditions: Control Set, Positive Incentive Set, and Negative Incentive Set. Each major set condition contained three sub-groups or sub-conditions: maintenance of set, realization of set, and non-realization of set.

On trials 1-10 the instructions received by all subjects were limited to a statement that they should perform as well as possible. Subjects in the Control Set conditions received, for all thirty trials, instructions to perform as well as they could. Instructions for subjects in the Positive Incentive Set condition for trials 11-30 were introduced for the purpose of establishing a positive set. The promise of six pieces of candy was used to establish this set. Subjects in the Negative Incentive Set condition were given six pieces of candy following trial ten, and were instructed that half of the candy would be taken from them if they did not perform well. These instructions were introduced for the purpose of estab-

lishing a negative incentive set.

The general control, positive, or negative incentive set conditions were maintained, realized, or non-realized during the one minute interval between trials twenty and twenty-one. Maintenance of set consisted of repeating the instructions given prior to trial eleven. For the Positive Incentive Set condition, set realization consisted of giving the promised six pieces of candy, and set non-realization consisted of telling the subjects that they had performed well enough to deserve the candy, but that it would not be given to them. For the Negative Incentive Set condition, set realization consisted of taking three pieces of candy from the subjects. Set non-realization consisted of telling the subjects that they had performed poorly and deserved to lose the candy, but that it would not be taken from them.

The following is a description of the experimental groups:

- Group 1 - (Control - Control) Instructions were to perform as well as possible for all thirty trials.
- Group 2 - (Control - Positive Incentive) Instructions for all thirty trials were to perform as well as possible. Following trial twenty, the subjects were told they were performing well enough to be given six pieces of candy, and the candy was given to them.
- Group 3 - (Control - Negative Incentive) These subjects were instructed to perform as well as possible during all thirty trials. Following trial twenty, they were informed that if they had been performing at a higher level, they would have received some candy. Therefore, they did not receive candy.
- Group 4 - (Positive Incentive - Positive Incentive) For trials 11-20, these subjects were informed that if they performed well, they would

be given six pieces of candy. These instructions were repeated for trials 21-30. The positive set was maintained for trials 11-30.

Group 5 - (Positive Incentive - Realization) Instructions informed the subjects that if they performed well, they would receive six pieces of candy. Following trial twenty they were informed that their performance was satisfactory enough to receive the candy that they had been promised. They were given the candy. Instructions for trials 21-30 were identical to those for trials 11-20.

Group 6 - (Positive Incentive - Non-realization) Instructions prior to trial eleven informed the subjects they they would receive six pieces of candy if they performed well. Following trial twenty they were informed that they had performed at a satisfactory level, but they would not be given the candy they had been promised. Instructions for trials 21-30 were identical to the instructions for trials 11-20.

Group 7 - (Negative Incentive - Negative Incentive) Between trials ten and eleven, these subjects were given six pieces of candy and told that half of it would be taken away from them if they did not perform well. These instructions were repeated during the interval between trials twenty and twenty-one. The negative set was maintained from trial 11 to trial 30.

Group 8 - (Negative Incentive - Realization) These subjects were given six pieces of candy and the same instructions as Group 7 between trials ten and eleven. Following trial twenty the subjects were informed that their performance level was too low and that three pieces of their candy would be taken from them. The candy was

then taken from them. Instructions identical to those given before trial eleven were repeated between trials twenty and twenty-one.

Group 9 - (Negative Incentive - Non-realization) Procedure for Group 9

was identical to the procedure for Group 8 except that following trial twenty, the subjects were told that their performance level was too low, and that although they deserved to lose three pieces of the candy, these pieces of candy would not be taken from them. The instructions given before trial eleven were repeated between trials twenty and twenty-one.

B. Subjects

A total of ninety right handed, mentally retarded subjects was selected from the pupils at Emid State School. There was an equal number of male and female subjects selected. None of the subjects had any gross motor disturbances, nor had any of them any previous experience with the rotary pursuit task. Chronological age limits were from twelve years to thirty-five years, and mental ages ranged from three years to eight years and eleven months. Intelligence quotients, as determined by the Stanford Binet Intelligence Scale, ranged from forty to seventy. The subjects were randomly assigned to each of the nine experimental groups, making ten subjects in each group.

C. Apparatus

The task for this experiment was a modified Koerth-type pursuit rotor revolving at 60 r.p.m. Scoring, in terms of time-on-target, was recorded in .01 seconds by a Standard Electric timer. The diameter of the turntable was 6.5 inches. The diameter of the target was 1.0 inches. The stylus

was 6.75 inches in length.

D. Procedure

Each subject performed for a total of thirty rotary pursuit trials of thirty seconds each. The intertrial interval was ten seconds and there were sixty second intervals between trials ten and eleven and between trials twenty and twenty-one. This was done in order to allow time for the administration of instructions and the taking away or giving of the candy.

All subjects received identical instructions for trials 1-10. These trials served as a "pre-test" warm-up period, and from them a measure of group comparability, prior to the introduction of the independent variables, was obtained. These trials also permitted the subjects a possible opportunity for a greater understanding of the requirements of the experiment.

The varied "sets" were introduced during the sixty second interval between trials ten and eleven. Following trial twenty, these sets were either maintained, realized, or non-realized. A comparison of the effects of incentive sets was obtained from an analysis of the scores in these trials.

Instructions for trials 21-30 were identical to the instructions for trials 11-20. Trials 21-30 afforded a measure of the possible differential effects upon performance of the maintained, realized, or non-realized set conditions.

IV. RESULTS

A hierarchical-type analysis of variance was computed on the scores in trials 6-10 in order to determine if the performance of the subjects in the general set conditions or in the sub-groups was significantly different when all subjects received comparable "pre-experimental" treatments. Table 1 shows that obtained F values were not significant. This indicates that prior to the introduction of varied set conditions, the subjects in the major set conditions and those in the sub-groups were performing at levels not significantly different.

A second hierarchical analysis of the variance of scores was performed on scores from trials 11-20. This analysis was computed in order to determine if the introduction of the major set conditions led to significant differences in performances under the major set conditions or in the nine sub-groups. Table 2 indicates that no significant differences were detected at or beyond the .05 level of confidence. A simple analysis of variance was performed on scores of the sub-groups in which set was to be maintained (sub-groups 1, 4, and 7), realized (sub-groups 2, 5, and 8), or non-realized (sub-groups 3, 6, and 9). This analysis was made in order to determine if the performances under these conditions differed significantly. Main-
tenance, realization, and non-realization of the three general set conditions were compared without regard to variation in the major set conditions. Table 3 indicates that no significant differences were found.

A third hierarchical analysis of the variance of scores was computed

on scores from trials 21-30. The purpose of this analysis was to determine if significant differences in performance could be detected among the major set conditions or among their sub-groups, after set had been maintained, realized, or non-realized, following trial 20. Table 4 reveals that no significant F values were obtained. A simple analysis of variance was computed on scores of sub-groups for conditions in which set was maintained, realized, or non-realized. The obtained F value was not significant, as shown in Table 5.

In order to discover if there were progressive significant differences in the performance of each sub-group, "t" tests were computed on the differences between means of trials 11-20 and 21-30. No significant "t" values were obtained.

Although statistical data failed to indicate significant differences among the nine sub-groups, a graphic presentation of the data does reveal some empirical differences. Figures 1, 2, and 3 are comparisons of the three sub-groups within each of the major conditions: Control Set, Positive Incentive Set, and Negative Incentive Set. Figure 4 presents a comparison of sub-groups 1, 4, and 7. These are the sub-groups in which set was maintained throughout the thirty trials. Figure 5 contrasts graphically sub-groups 2, 5, and 8. Set was realized, following trial 20, for these sub-groups. Figure 6 is a graphic comparison of sub-groups 3, 6, and 9. Set was not realized, following trial 20, for the subjects in these sub-groups.

TABLE 1

ANALYSIS OF VARIANCE OF SCORES IN WARM-UP PRE-TEST TRIALS 6-10 FOR THE
THREE MAJOR SET CONDITIONS AND THE NINE SUB-GROUP CONDITIONS

| Source of Variation | Sums of Squares | Degrees of Freedom | Mean Square | F | P |
|---------------------|-----------------|--------------------|-------------|--------|------|
| Between Conditions | 12.0281 | 2 | 6.014 | 1.6714 | >.05 |
| Between Groups | 28.7862 | 8 | 3.598 | 1.5086 | >.05 |
| Error | 81.0947 | 79 | 2.385 | | |
| Total | 121.9090 | 89 | | | |

TABLE 2

ANALYSIS OF VARIANCE OF SCORES OF THE THREE MAJOR SET CONDITIONS
AND THE NINE SUB-GROUP CONDITIONS ON TRIALS 11-20

| Source of Variation | Sums of Squares | Degrees of Freedom | Mean Square | F | P |
|---------------------|-----------------|--------------------|-------------|--------|------|
| Between Conditions | 31.5025 | 2 | 15.7512 | 2.2890 | >.05 |
| Between Groups | 55.0491 | 8 | 6.8811 | 1.0724 | >.05 |
| Error | 506.8906 | 79 | 6.4163 | | |
| Total | 593.4422 | 89 | | | |

TABLE 3
 ANALYSIS OF SCORES OF SUB-GROUPS IN WHICH SET WAS MAINTAINED,
 REALIZED, AND NON-REALIZED ON TRIALS 11-20

| Source of Variation | Sums of Squares | Degrees of Freedom | Mean Square | F | P |
|---------------------|-----------------|--------------------|-------------|-------|------|
| Between Conditions | 488.8084 | 2 | 31.8832 | .3913 | >.05 |
| Within Conditions | 63.7665 | 6 | 81.4680 | | |
| Total | 552.5768 | 8 | | | |

TABLE 2

ANALYSIS OF VARIANCE OF SCORES OF THE THREE MAJOR SET CONDITIONS
AND THE NINE SUB-GROUP CONDITIONS ON TRIALS 21-30

| Source of Variation | Sums of Squares | Degrees of Freedom | Mean Square | F | P |
|---------------------|-----------------|--------------------|-------------|--------|------|
| Between Conditions | 56.0042 | 2 | 28.002 | 2.4712 | >.05 |
| Between Groups | 90.6530 | 8 | 11.331 | 0.7570 | >.05 |
| Error | 1181.9723 | 79 | 14.962 | | |
| Total | 1328.6295 | 89 | | | |

TABLE 5

ANALYSIS OF VARIANCE OF SUB-GROUPS IN WHICH SET WAS MAINTAINED,
 REALIZED, AND NON-REALIZED ON TRIALS 21-30

| Source of Variation | Sums of Squares | Degrees of Freedom | Mean Square | F | P |
|---------------------|-----------------|--------------------|-------------|-------|------|
| Between Conditions | 148.7553 | 2 | 74.3776 | .5889 | >.05 |
| Within Conditions | 757.7911 | 6 | 126.2985 | | |
| Total | 906.5464 | 8 | | | |

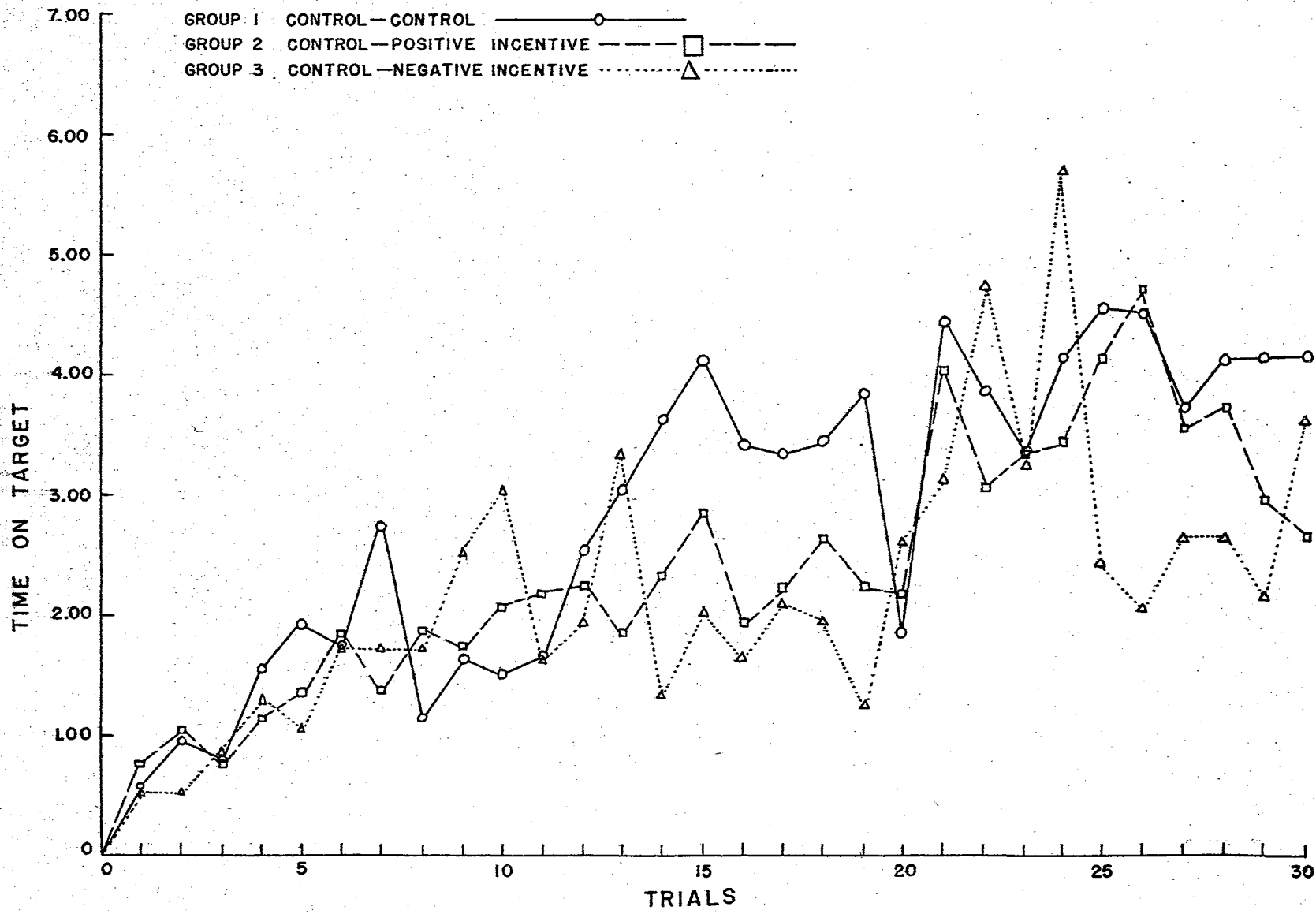


Figure 1. Mean Performance Scores of Sub-conditions Under Control Set Condition: Sub-groups 1, 2, and 3

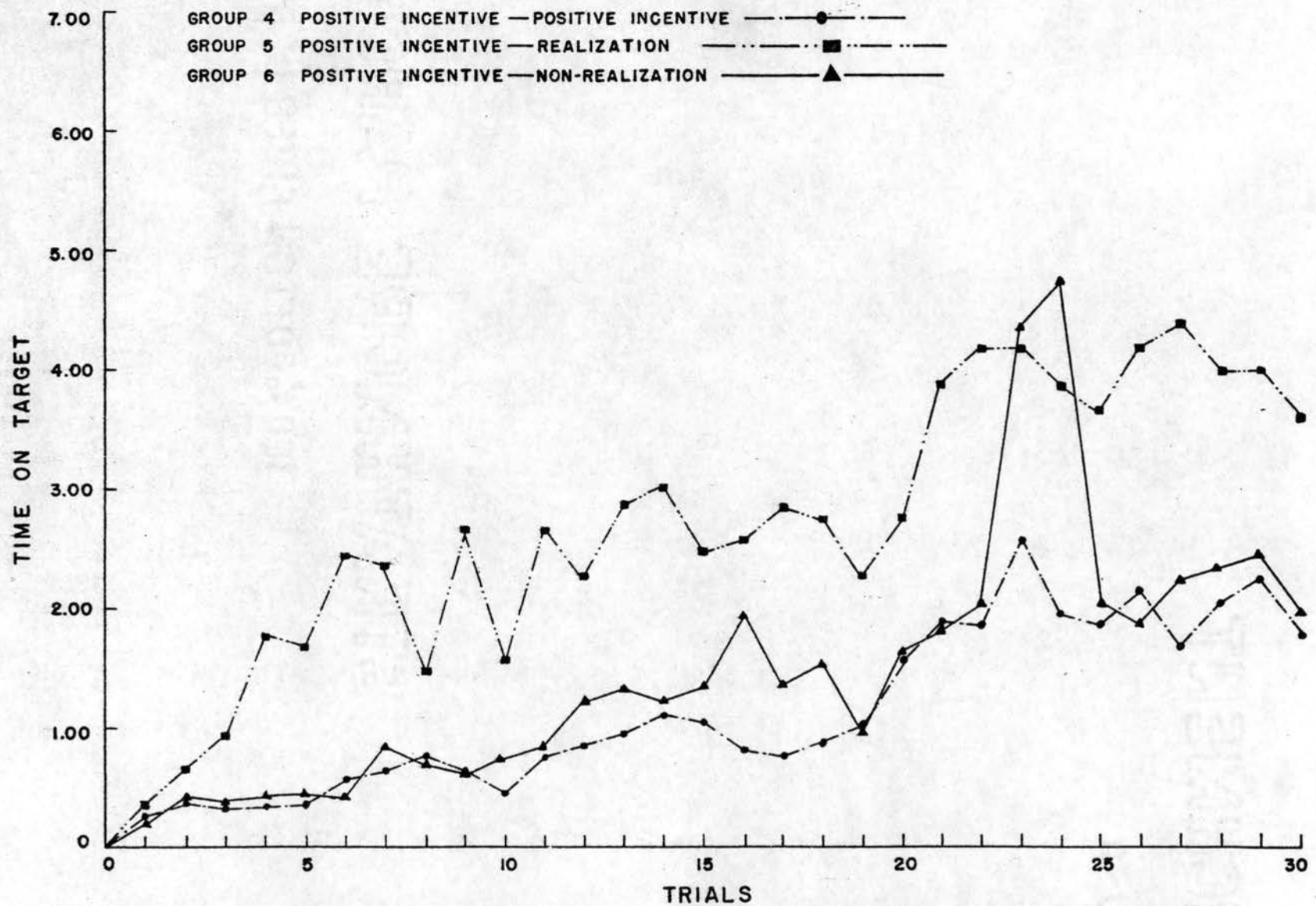


Figure 2. Mean Performance Scores of Sub-conditions Under Positive Incentive Set Condition:
Sub-groups 4, 5, and 6

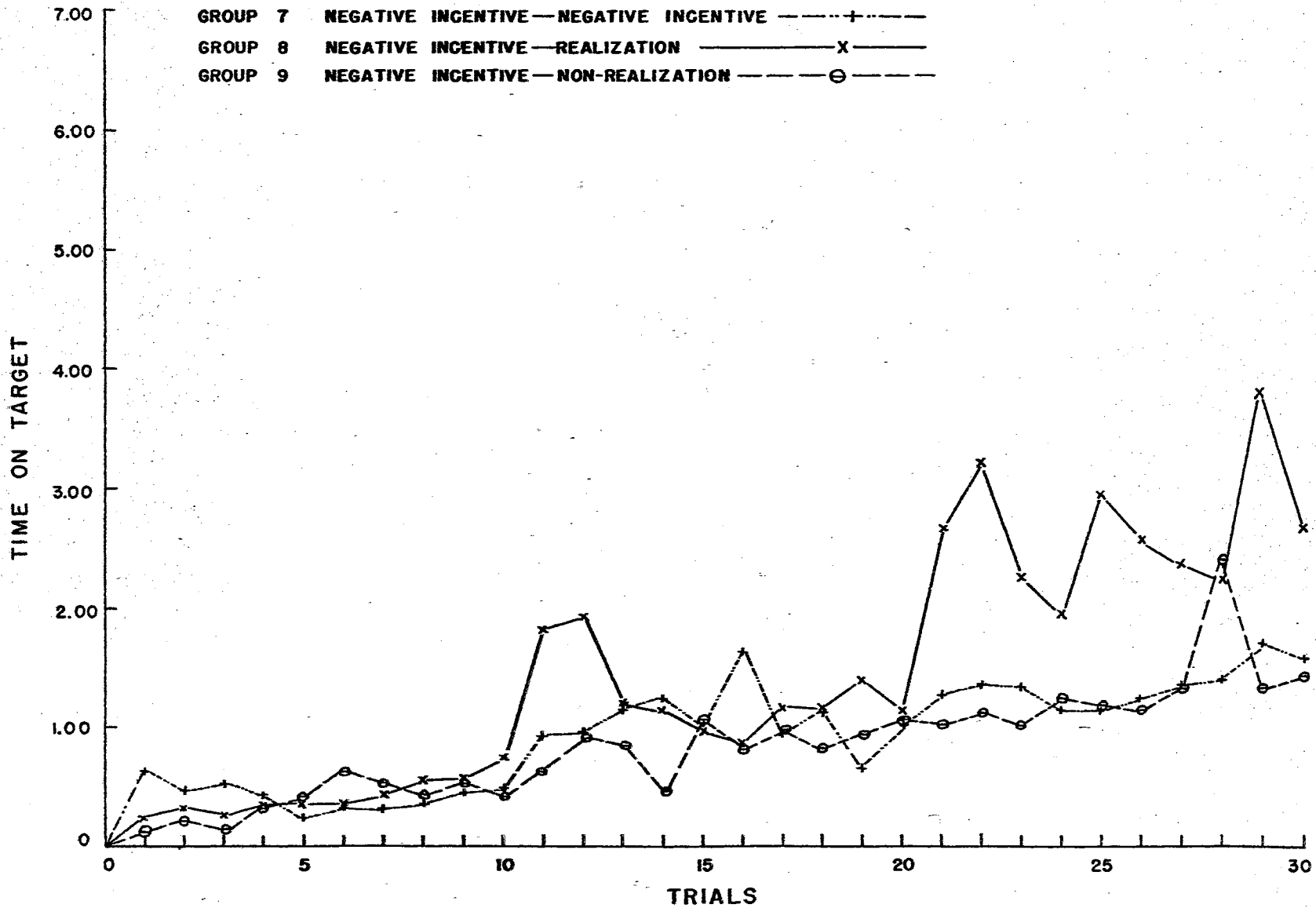


Figure 3. Mean Performance Scores of Sub-conditions under Negative Incentive Set Condition: Sub-groups 7, 8, and 9

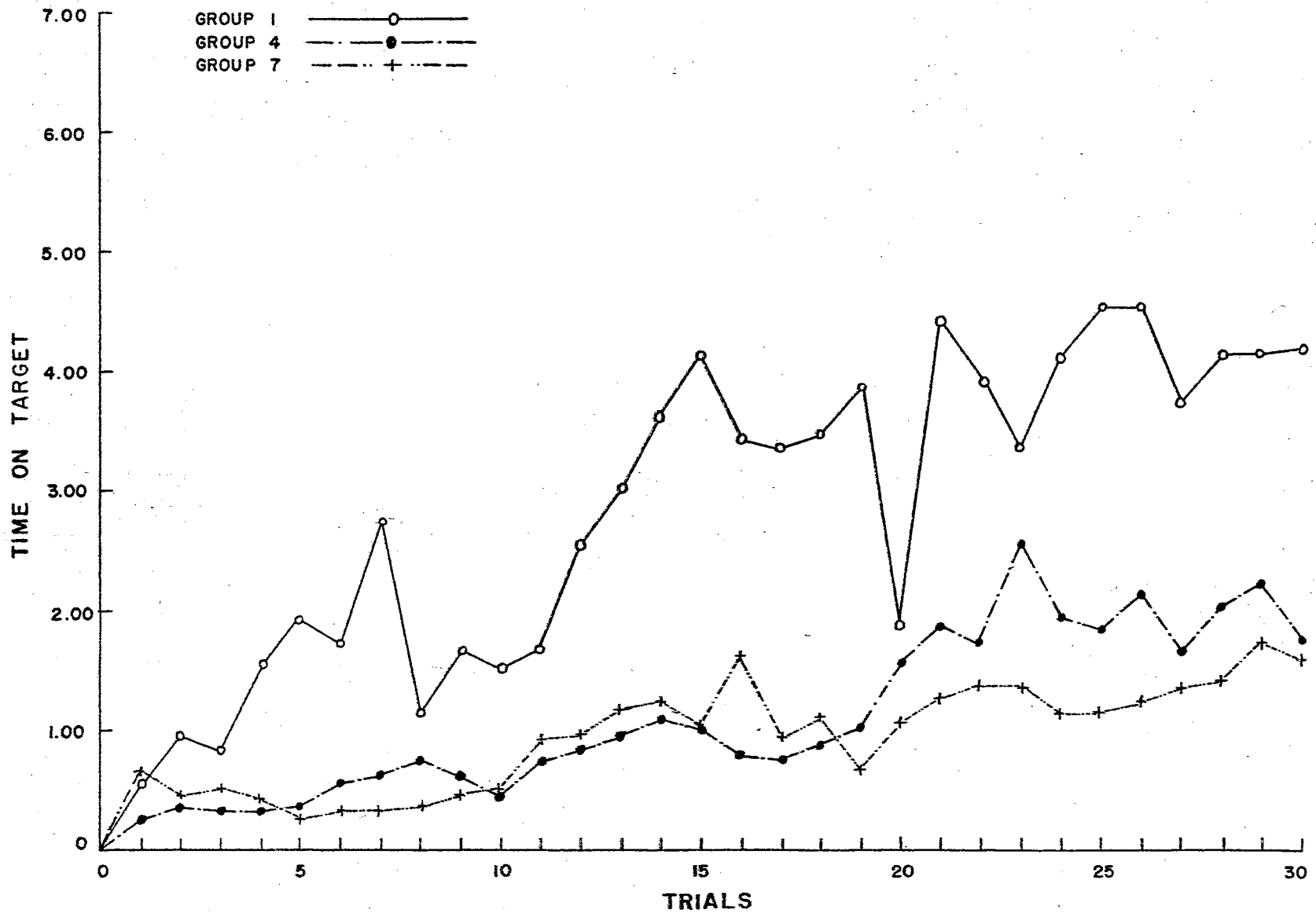


Figure 4. Mean Performance Scores of Sub-groups in Which Set Was Maintained

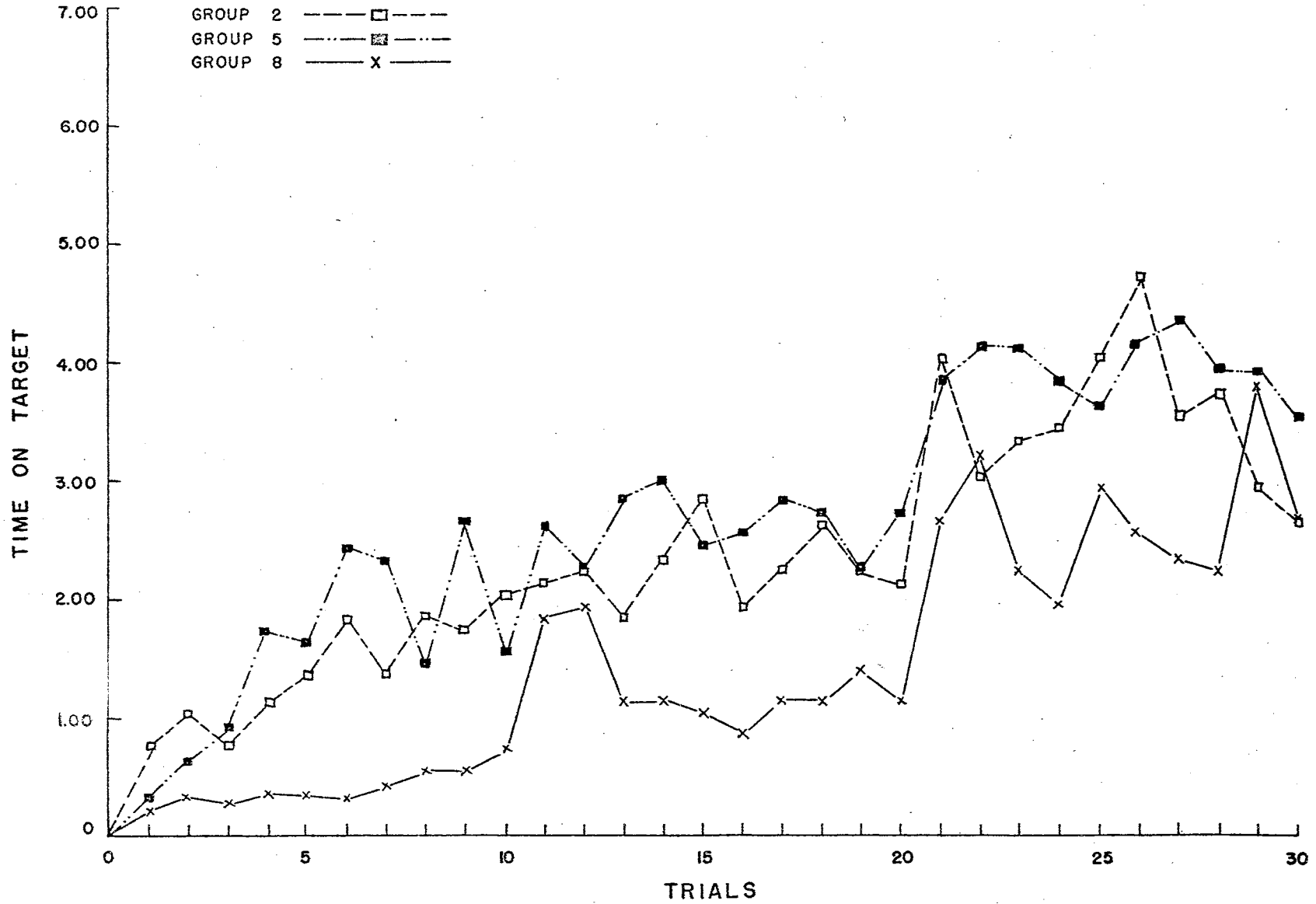


Figure 5. Mean Performance Scores of Sub-groups in Which Set Was Realized

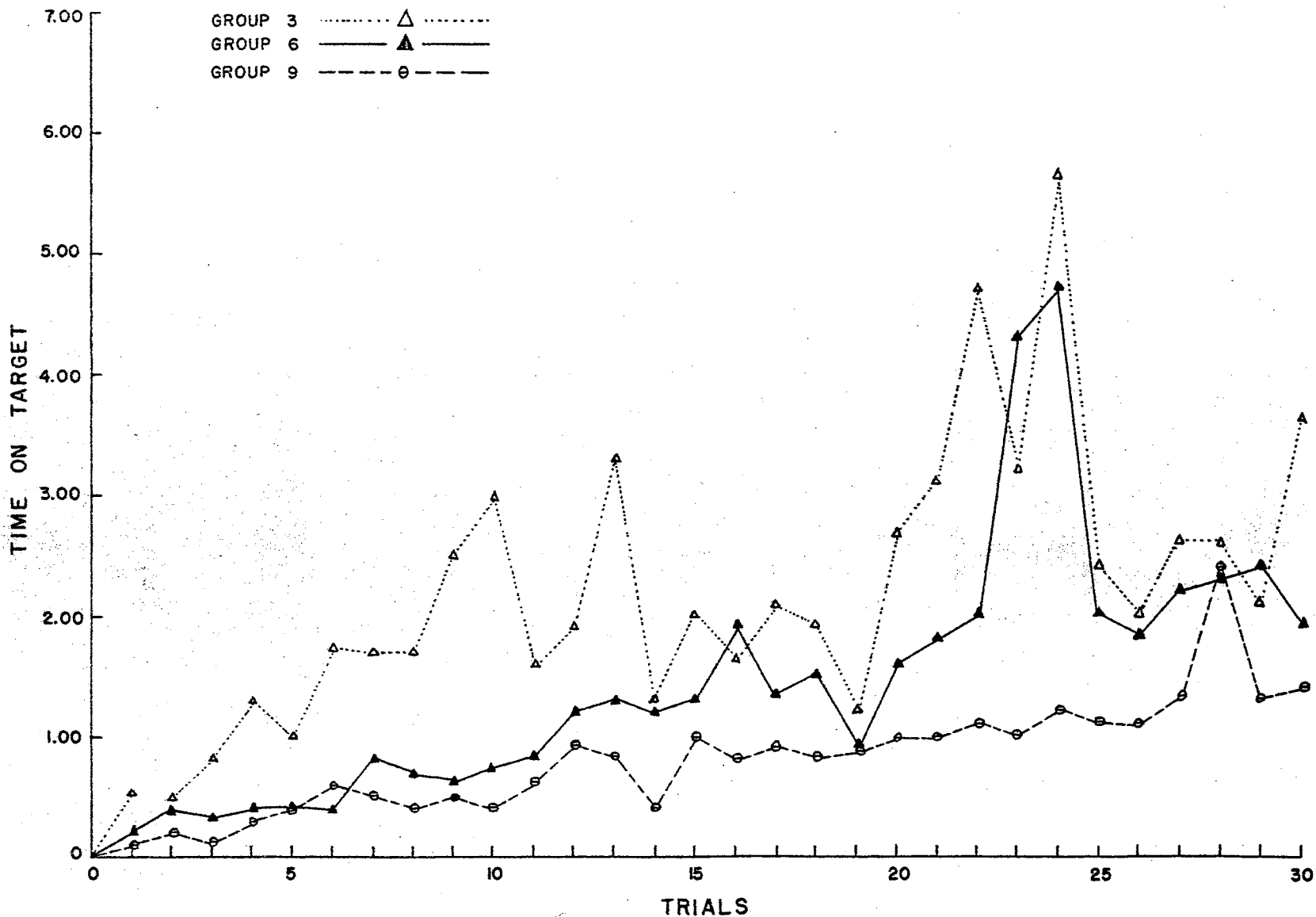


Figure 6. Mean Performance Scores of Sub-groups in Which Set Was Non-realized

V. DISCUSSION

The present study experimentally investigated the effects of the realization or non-realization of positive and negative incentive sets upon the rotary-pursuit performance of retardates.

Since experimental treatments were not introduced into the procedure until after trial ten, trials 6-10, in this study, were utilized for the purpose of making estimates of group comparability prior to the introduction of experimental treatments. If it could be demonstrated that subjects in these groups were performing at approximately equivalent levels, then any subsequent significant group differences in performance discovered, could be attributable to the effects of the independent variables. An analysis of the variance of scores in trials 6-10 indicated that there were no significant differences in performances of the subjects in the major set conditions or among the various sub-groups.

The general set conditions were introduced during the interval between trials ten and eleven. It was expected, therefore, that an analysis of the variance of scores in trials 11-20 would determine the effects of the varied sets upon performance. The obtained F values were not significant. The promise of a positive incentive, or a negative incentive, or no incentive (control) does not result in significant differences in performance. This finding is in contrast with some earlier studies. It has been demonstrated that positive incentives have a facilitating effect upon performance (Gordon, O'Connor, and Tizard, 1954; Cromwell and Moss, 1958). O'Connor

and Tizard (1954) demonstrated that retardates will work harder and more efficiently for a positive incentive than for no incentive at all.

Each of the major set conditions contain the sub-groups in which set was to be maintained, realized, or non-realized, following trial twenty. An analysis of variance of scores of these sub-groups, when they were combined to form the three conditions of maintenance of set, realization of set, and non-realization of set, would yield a measure of comparability of performance before set was maintained, realized, or non-realized. When the analysis was computed, the obtained F value was not significant. Therefore, any performance differences among these conditions in trials 21-30 could be attributed to the effects of maintaining, realizing, or non-realizing the set. When an analysis of variance was computed on the scores of these conditions in trials 21-30, no significant differences were detected. This finding is also in contrast to expectations based on psychological theory. Thorpe (1958) has pointed out that for expectancy to affect learning and performance, reinforcement must occur.

When scores of the major set conditions and the sub-groups were analyzed in trials 21-30, no significant differences were noted among the performances in the major set conditions or among performances in the nine sub-groups. Previous literature (Hurlock, 1925; Abel, 1936; Hilgard and Russell, 1950) reports that reward has a more facilitating effect upon learning than does punishment or a control condition. Tinklepaugh (1928) demonstrated when expectancy or set was not realized, greater variability of performance resulted.

The statistical analyses of the data of this study did not result in a rejection of the null hypotheses. Among the several apparent explanations for the discrepancies between the results of this study and previous studies,

is the possibility that retardates do not respond to positive and negative incentives in the same manner as do normals. However, O'Connor and Tizard (1954) made the following statement based on results of an extensive investigation of incentives and the mental retardate's learning:

"Imbeciles are capable of responding to incentives; they respond differently to incentives such as working for a goal and encouragement. The results show that with imbeciles, initial levels of achievement are critical determinants of subsequent performance."

A second hypothesis for the differences between the present results and previous experimental findings, could be that the pursuit rotor is not a comparable task for mental retardates. Barnett and Cantor (1957) point out, however, that although retarded individuals function at a lower level, their pursuit rotor performance is similar to that of normals.

Another possibility for explaining the lack of detection of significant differences in performances among the various groups may be deduced from the graphic representation of the data. Variability within each of the sub-groups could be great enough to prevent the differences among the sub-groups from being significant. Observation of the figures shows a great deal of within-variation in each of the groups, so this explanation is at least tenable.

A final possible explanation for lack of consistency between the present findings and the results of earlier studies, is that the subjects in this experiment appeared to the experimenter to be differentially responding to the presence and attentions of the experimenter to such a degree that the experimental incentives could have become subordinate to the above mentioned effects.

VI. SUMMARY AND CONCLUSIONS

1. This study investigated the effects of the realization or non-realization of positive and negative incentive sets on rotary-pursuit performance of mentally retarded subjects. Ninety subjects from a mentally retarded population were randomly assigned to nine experimental groups with ten subjects in each. The nine groups were divided into three major set conditions with three sub-groups each. The major conditions were: Control Set, Positive Incentive Set, and Negative Incentive Set. The three minor conditions or sub-groups of each major condition were: maintenance of set, realization of set, and non-realization of set. Each subject performed for thirty pursuit-rotor trials. For trials 1-10, which were pre-test warm-up trials, all subjects received the same instruction to perform as well as possible. Instructions for trials 11-20 were used to introduce the major set conditions. Following trial twenty, set conditions were maintained, realized, or non-realized. Instructions for trials 21-30 were identical with those for trials 11-20. Analyses of variance were computed on the scores in each of the sets of ten trials. "T" tests were computed on differences between means for trials 11-20 and trials 21-30. These statistical measures were taken in an attempt to evaluate the relative effects of the independent variables.
2. Statistical data did not reveal any significant differences among the performances of subjects in Control Set Condition, Positive Incentive

Set Condition, and Negative Incentive Set Condition.

3. Differences among performances of sub-groups in which set was maintained, realized, or non-realized were not statistically significant.

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APPENDICES

APPENDIX A

INSTRUCTIONS

(Read to all subjects before trials 1-10.) We would like to see how well you can perform on this pursuit rotor task. You are supposed to keep the point of this stylus on the target while it is moving (stylus and target are identified by pointing to them). Hold the cord and handle it in this fashion while you are attempting to keep the stylus in contact with the target (demonstrate with moving target). Make sure you hold the stylus lightly between the thumb and fingers and stand back so that you are in a comfortable position. Now show me the correct way to hold the stylus and cord, and the position in which you will be standing (necessary corrections are made). Now hold the stylus above the target. You will hear a warning buzzer and then the turntable will start. Do not try to put the stylus on the target until the turntable starts moving. Then try to get the stylus on the target and keep it on the target.

(Read to subjects in Control Set condition, following trial ten.) You may rest now. You are going to perform again in a little while. Be ready to start when you hear the buzzer. Do as well as you can.

(Read to subjects in Positive Incentive Set condition, following trial ten.) You may rest now. Here are six pieces of candy. They will be given to you if you can perform better than average. Do as well as you can, and remember, if you do better than average, you will be given the candy.

(Read to subjects in Negative Incentive Set condition, following trial ten.) You may rest now. I am going to give you these six pieces of candy for taking part in this experiment. Three pieces will be taken from you if you do not perform better than average from now on. Do as well as you can, and remember, if you do not do better than average, three pieces of your candy will be taken.

(Read to subjects in sub-group 1 following trial twenty.) You may rest now. Be ready to perform again when you hear the buzzer. Do as well as you can.

(Read to subjects in sub-group 2 following trial twenty.) You may rest now. If you had performed better than average on those last trials, you were going to receive six pieces of candy. Since you did perform better than average, the candy is yours. You are going to perform again, so be ready when you hear the warning buzzer. Do as well as you can.

(Read to subjects in sub-group 3 following trial twenty.) You may rest now. If you had performed better than average on those last trials, you were going to receive six pieces of candy. Since you did not perform well, you will not receive the candy. You are going to perform again, so

be ready when you hear the warning buzzer.

(Read to subjects in sub-group 4 following trial twenty.) You may rest now. You are going to perform again soon, so be ready when you hear the warning buzzer, and remember, if you perform better than average, you will be given six pieces of candy.

(Read to subjects in sub-group 5 following trial twenty.) You may rest now. Remember that you were told that if you performed better than average you would be given this candy. You performed very well, and the candy is yours. You are going to perform again soon, and if you do better than average, you will be given six more pieces of candy. Be ready when you hear the buzzer.

(Read to subjects in sub-group 6 following trial twenty.) You may rest now. Remember that you were told that if you performed better than average you would be given six pieces of candy. You performed very well, much better than average, but you will not be given the six pieces of candy this time. If you do better than average on the next trials, you will be given six other pieces of candy. Be ready when you hear the buzzer.

(Read to subjects in sub-group 7 following trial twenty.) You may rest now. You are going to perform again soon, so be ready when you hear the warning buzzer. Remember, unless you perform better than average, three pieces of your candy will be taken.

(Read to subjects in sub-group 8 following trial twenty.) You may rest now. Remember that you were told that if you did not perform better than average, three pieces of candy would be taken. You did not perform better than average, so the candy will be taken now. You are going to perform again, and unless you do better than average, the remainder of your candy will be taken. Be ready when you hear the buzzer.

(Read to subjects in sub-group 9 following trial twenty.) You may rest now. Remember that you were told that unless you performed better than average, three pieces of the candy would be taken. You did not perform better than average and the candy should be taken. But the candy will not be taken now; you may keep it. You are going to perform again, and unless you do better than average, three pieces of the candy will be taken. Be ready when you hear the buzzer.

APPENDIX B

APPENDIX TABLE 1

MEAN PERFORMANCE SCORES (IN .01 SECONDS)
OF SUBJECTS IN CONTROL SET CONDITION

| Trials | Group 1 | Group 2 | Group 3 |
|--------|---------|---------|---------|
| 1. | .577 | .797 | .592 |
| 2. | .980 | 1.030 | .528 |
| 3. | .813 | .785 | .878 |
| 4. | 1.556 | 1.118 | 1.314 |
| 5. | 1.903 | 1.368 | 1.073 |
| 6. | 1.716 | 1.805 | 1.799 |
| 7. | 2.747 | 1.399 | 1.727 |
| 8. | 1.141 | 1.887 | 1.722 |
| 9. | 1.688 | 1.733 | 2.511 |
| 10. | 1.507 | 2.076 | 3.080 |
| 11. | 1.698 | 2.191 | 1.620 |
| 12. | 2.547 | 2.216 | 1.940 |
| 13. | 3.043 | 1.814 | 3.393 |
| 14. | 3.610 | 2.316 | 1.547 |
| 15. | 4.133 | 2.840 | 2.012 |
| 16. | 3.414 | 1.928 | 1.662 |
| 17. | 3.390 | 2.254 | 2.120 |
| 18. | 3.470 | 2.622 | 1.996 |
| 19. | 3.851 | 2.216 | 1.259 |
| 20. | 1.880 | 2.109 | 2.616 |
| 21. | 4.406 | 4.093 | 3.169 |
| 22. | 3.896 | 3.074 | 4.741 |
| 23. | 3.340 | 3.314 | 3.275 |
| 24. | 4.106 | 3.448 | 5.700 |
| 25. | 4.536 | 4.139 | 2.468 |
| 26. | 4.527 | 4.705 | 2.081 |
| 27. | 3.737 | 3.551 | 2.681 |
| 28. | 4.137 | 3.716 | 2.665 |
| 29. | 4.143 | 2.973 | 2.176 |
| 30. | 4.164 | 2.676 | 3.639 |

APPENDIX TABLE 2

MEAN PERFORMANCE SCORES (IN .01 SECONDS) FOR SUBJECTS
IN POSITIVE INCENTIVE SET CONDITION

| Trials | Group 4 | Group 5 | Group 6 |
|--------|-----------------|------------------|------------------|
| 1. | .285 | .361 | .236 |
| 2. | .874 | .623 | .408 |
| 3. | .321 | .909 | .379 |
| 4. | .335 | 1.776 | .432 |
| 5. | .387 | 1.684 | .438 |
| 6. | .581 | 2.411 | .410 |
| 7. | .603 | 2.344 | .851 |
| 8. | .778 | 1.474 | .701 |
| 9. | .620 | 2.670 | .622 |
| 10. | .458 | 1.569 | .771 |
| 11. | .759 | 2.627 | .845 |
| 12. | .841 | 2.267 | 1.235 |
| 13. | .960 | 2.866 | 1.308 |
| 14. | 1.100 | 3.000 | 1.201 |
| 15. | 1.060 | 2.480 | 1.337 |
| 16. | .800 | 2.576 | .980 |
| 17. | .790 | 1.826 | 1.341 |
| 18. | .897 | 2.708 | 1.512 |
| 19. | 1.005 | 2.270 | 1.985 |
| 20. | 1.580 | 2.754 | 1.614 |
| 21. | 1.893 | 3.893 | 1.809 |
| 22. | 1.721 | 4.156 | 2.074 |
| 23. | 2.576 | 4.165 | 4.331 |
| 24. | 1.930 | 3.842 | 4.786 |
| 25. | 1.826 | 3.628 | 2.037 |
| 26. | 2.144 | 4.173 | 1.891 |
| 27. | 1.659 | 4.346 | 2.206 |
| 28. | 2.046 | 3.991 | 2.309 |
| 29. | 2.216 | 3.943 | 2.445 |
| 30. | 1.741 | 3.571 | 1.943 |

APPENDIX TABLE 3

MEAN PERFORMANCE SCORES (IN .01 SECONDS) FOR SUBJECTS
IN NEGATIVE INCENTIVE SET CONDITION

| Trials | Group 7 | Group 8 | Group 9 |
|--------|---------|---------|---------|
| 1. | .630 | .233 | .154 |
| 2. | .493 | .321 | .234 |
| 3. | .508 | .283 | .175 |
| 4. | .438 | .362 | .379 |
| 5. | .263 | .356 | .436 |
| 6. | .323 | .329 | .624 |
| 7. | .327 | .415 | .571 |
| 8. | .383 | .578 | .489 |
| 9. | .471 | .573 | .557 |
| 10. | .499 | .732 | .473 |
| 11. | .927 | 1.807 | .694 |
| 12. | .963 | 1.932 | .968 |
| 13. | 1.192 | 1.128 | .890 |
| 14. | 1.243 | 1.162 | .468 |
| 15. | 1.044 | 1.032 | 1.011 |
| 16. | 1.625 | .891 | .868 |
| 17. | .950 | 1.193 | .973 |
| 18. | 1.106 | 1.190 | .838 |
| 19. | .660 | 1.400 | .909 |
| 20. | 1.063 | 1.135 | 1.039 |
| 21. | 1.299 | 2.690 | 1.030 |
| 22. | 1.366 | 3.200 | 1.143 |
| 23. | 1.344 | 2.238 | 1.011 |
| 24. | 1.125 | 1.955 | 1.286 |
| 25. | 1.134 | 2.962 | 1.191 |
| 26. | 1.238 | 2.581 | 1.157 |
| 27. | 1.363 | 2.394 | 1.398 |
| 28. | 1.400 | 2.264 | 2.436 |
| 29. | 1.715 | 3.804 | 1.312 |
| 30. | 1.593 | 2.692 | 1.416 |

VITA

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