

THE EFFECTS OF VERBAL REINFORCEMENT ON THE BEHAVIOR OF
MILD AND MODERATE INSTITUTIONALIZED
MENTALLY RETARDED CHILDREN

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CHAPTER I

INTRODUCTION

It has slowly become clear that there is no simple relationship between learning ability and age, the latter being calculated either by a calendar (chronological age) or by the results of a standardized intelligence test (mental age) (1). While it is reasonable to claim that mental age is probably the single best index of a child's ability to master cognitive learning tasks, there are significant differences in learning ability among individuals whose mental ages are the same but whose chronological ages differ.

It would be reasonable to suppose that studies of the learning process, emanating from the laboratories of psychologists interested in learning theory, would do much to elucidate the differences between retarded and normal children; indeed, considerable progress has occurred. Since approximately 1955, the number of studies of learning in which mentally retarded have been used as subjects has increased dramatically. In view of this development, it is perhaps surprising that no coherent picture of the learning capacities and learning deficits of such children has emerged. The advances which

have been made toward understanding the learning behavior of retarded children tend to be fragmented and specialized.

Perhaps the chief reason for this state of affairs is the fact that many learning theorists have shown more interest in learning processes per se than in the nature of the organism that is learning. They have searched for learning phenomena which can be demonstrated equally well in creatures of many sorts, including earthworms, rats, and monkeys; the extension of their studies to mentally retarded children appears merely to be a logical step in the phylogenetic scale. Even these efforts have tended to be concentrated on institutionalized children, since their captivity makes them convenient for study. When research is conceived in this fashion, it may well yield results which are very important to the scientist who is interested in general laws of behavior (1), but it is of relatively little use to workers whose primary interest lies in the understanding of individual differences, particularly differences among retarded children and between them and children who are brighter than they. As a result, although considerable evidence has accumulated about the learning behavior of retarded children, at present it tends to be fragmented, disorganized, and unrepresentative of the many retarded children living at home (3).

Of relatively recent origin is the extension of operant conditioning studies, and the inverse decline of classical

conditioning studies, with respect to mentally retarded subjects. The effects of different verbal incentive conditions on the performance of institutionalized children have received much attention in the past and are under intense study with respect to the present. One of the obvious reasons for this upsurge is that the role of the institution housing retarded children rarely escapes the pragmatic fate of releasing the subject to parents, who are lacking or at least limited with respect to the continued treatment and technical insight required to enhance and further the development of the child. The effects of reinforcing conditions, especially verbal, on the mentally retarded child are usually one of the easiest to communicate and most widely understood by parents, also, including non-professional members of the institutional staff.

While researchers may be meticulous in defining the variables involved in verbal-incentive investigations, it is exceedingly difficult to determine the stimulus and perceptual repertoire of retarded children. When a retarded child responds to a complex situation, it is not usually clear what aspect of the situation is controlling the child's behavior. In most cases it is difficult to determine to what extent these children can respond to speech discriminatively, since the situations are usually complex and many stimuli may provide the basis for the simple performances. However, controlled experiments show unequivocally that behavior can come under the

control of simple stimuli when differential aspects of the performance were correlated with the different stimuli (4, pp. 149-155).

It may be noted that one researcher initiates some interesting postulates with regard to the effects on performance as a result of reward (praise) and criticism (reproof). McCandless reveals that while criticism or failure of a bright child may possibly improve or stimulate the child's performance in a positive direction, this procedure may reduce, discourage, and have its effect in a negative direction with respect to the handicapped or retarded child who is already doing poorly (2). This investigator further states that ". . . while reward does not do very much 'extra' for the bright and successful child, reward is a motivation and incentive to stimulate the performance of the unsuccessful and handicapped [retarded] child 'highly'."

McCandless also states that

The bright child expects to succeed, hence success and praise do not surprise him or raise him to new levels of performance. He does not expect to fail or be criticized; hence, when such things happen to him, the effect is great. The punishment, as it were, is so severe that he redoubles his efforts to avoid encountering it again. The failing child expects failure and criticism, hence it has little effect on him except to confirm his beliefs and reduce his effort. But an experience of praise or reward is so striking and sweet that he works doubly hard to encounter such a state of affairs again (2, p. 148).

In other words, McCandless is postulating that ". . . an unexpected consequence or reinforcement (success for one who expects to fail, failure for one who expects to succeed) should positively affect the performance of the subject" (2, p. 167).

The present study is an effort to investigate some of the pertinent implications, principles, and postulates revealed by learning theorists, specifically McCandless, using mentally retarded children as subjects. The following sub-problems are investigated and discussed:

1. To what extent do praise and reproof influence the performance of retarded children on a simple learning task?
2. A more important question seems to be whether praise or reproof has differential effects depending on the degree of retardation: that is, is there an interaction between verbal incentives and levels of retardation?

The principal problem underlying the present investigation was to empirically test two specific hypotheses.

Hypothesis 1.--The relative superiority of types of verbal reinforcement (praise or reproof) will depend on the level of the retardation of the child (mild or moderate). More specifically,

(a) mildly retarded children will perform better under verbal reproof than under verbal praise, and

(b) moderately retarded children will perform better under verbal praise than under verbal reproof.

Hypothesis 2.--The performance of mildly retarded children will be superior to that of moderately retarded children regardless of the nature of the verbal reinforcement employed (praise or reproof).

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CHAPTER II

SURVEY OF LITERATURE

A current survey of the literature, with respect to a specified topic, must currently take into account the fact that experimental findings, postulates, and hypotheses originate from many of the diversified areas within the field of psychology. Many hypotheses that originate from the clinical area are now being tested in the laboratory, and vice versa.

In view of this diversification and division of labor, it seems necessary to separate, as appropriately as possible, these findings with respect to their appropriate division. The summary at the end of the chapter welds together the findings of each division as they affect the present study.

Studies Related to Social Reinforcement

Utilizing the social learning theory outlined by Rotter and his students, a number of psychologists have explored the effects of expectancy on the behavior of retarded children (24). They have reasoned that the child's previous history of reinforcement and his developmental level are among the chief determinants of his expectations concerning a novel situation and of his reactions to success and failure. Two

general assumptions have constituted the main areas of study. First, several psychologists have reasoned that the retarded child's reaction to reward and punishment differs from that of the normal child, not only because he is less highly advanced intellectually, but because he has a history in which failure is much more prominent than it is in the child with normal capacities. Cromwell has pointed out that

. . . it is reasonable to assume that the typical retarded child may, because of his limited ability have met with more failure during his life than has the typical normal child. Consequently, we would expect the retarded child to have a relatively lower generalized expectancy for success (6, p. 333).

The few studies which have explored this notion have tended to confirm it. Stevenson and Zigler (37), for example, predicted that retarded subjects would respond differently in a probability learning situation than would normal subjects of comparable mental age. Because retarded subjects had learned to expect and to be satisfied with lower degrees of success than had normal children, these authors reasoned, their behavior should be more sensitive to partial reinforcement than would normal children. (Before discussing the aspects of this study it should be noted that these predictions would apply to any group of children with similar reinforcement history. There is evidence, for example, that institutionalized children of normal intelligence may react to reinforcement in a manner more like that of retarded institutionalized children than like that of noninstitutionalized

normal or retarded children (28). The essential factor is the child's personal history, not his intellectual aptitudes per se.)

In a discrimination learning situation, Stevenson and Zigler found that the retarded subjects did tend to choose the reinforced stimulus more often than did the normal children when it was reinforced only one-third and two-thirds of the time. Both groups, as had been expected, selected the reinforced stimulus when it brought a reward every time.

The notion that retardates have a low expectancy for success and therefore modify their performance differently from normal children after a success or a failure was illustrated by Heber (13) and Gardner (10). On the basis of these studies, it appears likely that a great many retarded children have learned to expect failure and have also learned that after a failure it is seldom worthwhile to increase one's efforts, since further failure is so likely to ensue. Heber and Gardner found that, indeed, normal children tended to increase their efforts after a failure more frequently and to a greater degree than did retarded children of the same mental age. Under conditions of success, the opposite appeared to be true. For retarded children, success apparently contrasts with their previous history and motivates them to increase their efforts even more than it does for normal children, for whom success is common. Thus, the evidence

suggests that in a difficult situation (for example, an intelligence test), the retarded child is less likely to do his best than is the normal child; his performance will be depressed not only by his low ability, but also by his expectation of failure and his consequent refusal to make a serious effort.

Another investigator that offers strong support for the influence of past reinforcement history on task accomplishment is McCandless (19). Of primary interest are the theoretical implications derived from McCandless's explanatory concepts that seemingly have evolved from aspiration studies.

McCandless supports that the individual's level of aspiration is sensitive to a large number of stimuli. According to McCandless, the subject's previous history has initiated the formation of an expectancy with respect to performance during tasks. McCandless would say that a subject's optimism or pessimism with respect to a certain task is carried into the experimental situation by the subject. Another aspect of the function of aspiration according to McCandless is the importance of the goal object (or reward).

McCandless contributes most of the variance of the level of aspiration to avoiding failure rather than behavior involved in achieving success.

Following a unit of behavior or a specified response that can be termed "successful," McCandless feels the aspiration

level is raised. The inverse is true for a "failing" condition. If the subject "fails," then there is a lowering of the level of aspiration. Another significant point McCandless reports is that following either success or failure, maladjusted children and adults react either more extremely, more variably, or both, than do normal subjects. McCandless finds that following a condition of failure, the level of aspiration of maladjusted subjects may increase drastically. Also, under these same conditions, the level of aspiration may undergo an immediate decrease. As do the theorists who support positive reinforcement, McCandless feels that behavior is more predictable following success conditions than behavior that occurs after failure (1).

An underlying, but very nebulous, assumption evolving out of McCandless's ideas seems to be that mildly retarded children have a closer association with normals than do moderately retarded children. There is also the possibility that the writer is carrying some of the McCandless postulates beyond that which he supported.

In summary, however, McCandless supports strongly that experiences of failure interfere and inhibit intellectual performance and experimentally induced failure should result in a decline in overall performance on the specified task (2, pp. 255-258).

Another assumption investigated by social learning theorists has been the notion that the ability to conceptualize success and failure as the outcome of one's own efforts must be learned. It depends, for its emergence, upon increasing intellectual and physical maturity. Bialer and Cromwell (3), for example, allowed retarded children to complete one puzzle but interrupted them before they had finished a second one. They found that the younger and duller children were more likely to return to the puzzle they had completed (seeking reward), while the older and brighter ones tended to return to the interrupted puzzle (seeking success). Bialer (2) followed up this study with a more complex one using normal and retarded subjects. Besides the completed and interrupted puzzle situation, he used a questionnaire designed to test the children's ability to see the outcome of events as being under their own control and three simple measures of their tendency to postpone immediate gratification in order to receive a greater reward at a later time. As Bialer had predicted, with increasing age there was a significant tendency for subjects, whether they were classed as normal or retarded, to perceive the locus of control as lying within themselves, to respond to success-failure cues rather than to pleasure-unpleasantness cues, and to delay gratification when such a delay led to the eventual attainment of a larger reward. Mental age rather than chronological age

was most relevant to the development of these characteristics. Bialer concluded that, on these dimensions, the retarded children followed the same developmental pattern as did normal children but that they did so at a slower pace.

That this learned system of success and failure is not simple has, however, been demonstrated by several workers. Bialer found that in his second study the data from the interrupted puzzle task did not conform to the predictions indicated by the other measures he used. The reasons for this discrepancy are not as yet clear (5). Reasoning from the same theory and extending it, Miller (21) compared subjects with an internalized locus of control with those having an externalized locus of control (as indicated by responses to a questionnaire). He found, as he expected, that under success-reward conditions both groups performed equally well. When the external conditions were not rewarding, however, the subjects with an externalized locus of control tended to do much more poorly; the subjects with an internalized locus were much better equipped to withstand failure or lack of reinforcement. Expected differences also appeared when the subjects were shifted to a different reinforcement condition. The externalized locus subjects, for example, improved dramatically when they were shifted from failure to success.

Studies Related to Kinds of Rewards and Reaction Time

In spite of the current interest in the nature of reinforcing stimuli, little research has been done to compare the efficacy of different kinds of rewards on the behavior of mental retardates. Moreover, there are virtually no data pertaining to the effects of a particular reinforcer on behavior over an extended period of time. One study that has investigated the effects of different kinds of rewards has been completed by Baumeister and Ward (1). These investigators utilized sixty male residents, between the ages of 12 and 35 years, selected from the population of a state institution for the mentally retarded. The mean C. A. was 18.0. Standard deviations were 9.1 and 5.2 years, respectively. Two experiments were designed to reveal the effects of reinforcement on the reaction times of these subjects. In one study, four different reward conditions were compared. The second study was concerned with the effects of one incentive over a number of test sessions. The results indicated that the reaction times of retardates are influenced by different types of rewards. Money and praise appeared to be about equal in producing desired effects. The second study demonstrated that reaction time performance is affected over a long period of time by momentary rewards. Moreover, a reward administered to well-practiced subjects resulted in a marked improvement in performance.

The first of these two studies indicates that retardates are differentially responsive to various rewards. These results are in disagreement with those of Wolfensberger (34). Wolfensberger found no effect on reaction times of mental defectives due to either reward or punishment, whether concrete or indirect. He suggested that verbal reinforcements may be more efficacious than material rewards, although he had presented no evidence in support of this conjecture. The findings presented by Baumeister and Ward, however, do not support his hypothesis. Verbal praise and money facilitated performance about equally.

One of the important differences between the studies of Baumeister and Ward and that of Wolfensberger is in the way in which the reinforcements were programmed. Wolfensberger rewarded his subjects on a fixed ratio schedule, that is, one out of every five trials. Thus, speed was irrelevant to reinforcement. It is not surprising that none of Wolfensberger's reward conditions produced an effect upon reaction time. In Baumeister and Ward's study, however, reinforcement was contingent upon the speed of each response so that the subject's performance determined whether or not he would be rewarded. This finding indicates that reaction time performance is subject to some of the same principles as other forms of instrument behavior (1).

Studies Related to Kinds of Rewards and Individual Values

Some investigators feel that the experimental effort to relate the behavior of the mental retardate to the tangible contingencies or consequences of action variously termed rewards, reinforcers, lures, punishments, incentives, and goal objects have met with indifferent success (26). The reasons for failure are undoubtedly multiple, but heading the list is the strong possibility that the commonly employed intuitive specification of incentive variation is poorly correlated with the subject's value system. Research studies supporting this concept proclaim that to insure that the investigator is effectively manipulating the independent variable, the value of the incentive should be subject-determined. This implies a scaling procedure (26).

In several early studies of primate behavior, Harlow and his psychophysical method of pair-comparisons scale the incentive in both its qualitative and quantitative specification (9, 12). This procedure for discovering incentive values offers considerable promise and has recently been examined systematically by Witzol (33) and his collaborators in its application to both normal and retarded children. Verbal statements, phrases, and words within statements may have certain subjective incentive values that could be scaled using the mental retardate as a subject.

Studies Related to Discrimination and Reinforcement

The majority of studies investigating the effects of reinforcement normally carry the postulate that the organism in the experiment is discriminating between stimuli in the same fashion as the experimenter or characteristics assumed in the research design (20). For this reason, it is necessary to discuss the interaction between discrimination and reinforcement in the mental retardate.

Methodological approaches to the study of discrimination learning have been relatively well developed, and it is not surprising that many if not most studies of learning in retarded subjects have employed this type of problem. Unfortunately, many of the research workers have been more sophisticated about learning methodology than about mental retardation, with the result that they have been careless in the selection and description of their experimental subjects.

A number of investigations have yielded information about the comparative discrimination-learning abilities of retarded and normal subjects of comparable mental age. Unfortunately, their subjects have been vaguely described, and their procedures have been so varied that the available results are difficult to interpret. A number of these studies have not, in fact, found significant differences in discrimination learning between retardates and normal children of the same mental

age (8, 16, 18, 22, 23, 27, 32). In contrast, others have found retardates significantly inferior at such tasks (11, 14, 25, 29).

To some extent, the differences between these studies seem to suggest that mildly retarded cultural-familial children do not show a discrimination deficit but that brain-damaged retarded children or those with mental ages below about five years do show the deficit. The possibility that organic factors may be involved has been directly investigated in several studies. Martin and Blum (18), for example, tested fifty-five normal children, forty-five cultural-familial retardates of comparable mental age, and twenty-two mongoloid children. They found no differences between the first two groups on several different measures, but the mongoloid children were inferior on all measures even after a statistical correction had been made for their lower mental ability.

A number of variables appear to affect the rate of discrimination learning in retarded children. Proximity of the stimulus to the reward (35) and, under certain conditions, a greater reward for correct answers (4), as well as various distinctive qualities of the stimuli themselves (35), may have a facilitating effect.

Of special interest regarding the processes whereby retarded children learn discriminations and reversals is

the study by O'Connor and Hermelin (22). These authors trained ten normal and ten retarded children of the same mental age on a discrimination problem then reinforced a reversal. They found that the retarded subjects learned the reversal more readily, but that eight of the normal subjects were able to verbalize the basis of their discrimination response, while only one retarded subject could do so. This finding is in accord with a prediction by Luria (17), that a verbal association established in connection with a motor habit exerts control over the habit and retards its reversal. Such studies suggest that moderately to severely retarded subjects learn more nearly in the manner of lower animals than in the manner of more intelligent human beings, who much more readily and efficiently utilize and receive verbalizations as a mediator. From this point another point can be made. If moderate and severely retarded children are unable to establish connections between verbal associations and motor habits, then research designs contingent upon their ability to do so would be misleading and confused.

Stevenson and Wier (31) conducted a related study with respect to this problem. They selected thirty subjects at each of four age levels from three to nine years to determine the effects of initial reinforcement and nonreinforcement of a single response on behavior during the subsequent trial. According to the authors, the results of the analysis provide

clear evidence that the effect of reinforcement and non-reinforcement of a single response differs significantly as a function of chronological age. Again, the perceptual repertoire with respect to the stimulus (reinforcement) is held in doubt with respect to moderately retarded children.

Studies Relating the Effects of Verbal Incentives

There have been some consistently reported findings in recent investigations pertaining to children's reactions to verbal incentives. A common finding has been the superiority of praise, over a neutral or negative verbal incentive condition, in producing persistence or improving performance with children. Recent studies related to mentally retarded children reveal significant differences, on Pursuit-Rotor performance, under conditions of praise and reproof. Praise was found to have a catalytic effect for mental retardates (20). This finding is consistent with earlier studies revealing a greater response to verbal incentives by institutionalized retarded children (36).

Other investigators have felt that in order to find significant facts concerning verbal incentives, the range of possibilities must be broadened. A study researching the effects of verbal incentives on children's school work found that praising the child was more effective than reproofing, ignoring, or telling him to work as usual (15). A more

recent complimentary study found higher performance by retarded children on a simple motor task under a praise or neutral condition than under a punishing condition (30). Some investigators see an asset in distinguishing urging effects from praise. Regardless, urging and praise have resulted in increasing the performance of retarded children (7).

Summary of Review of Literature

In summary, the effects of reinforcement on the behavior of mental retardates are contingent upon variables associated with expectancy, discrimination, reaction times, kinds of reinforcement and the subjective state of the individual organism.

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CHAPTER III

METHOD

The following chapter outlines in detail the method and procedure designed to detect the relative effects of two different qualities of reinforcement (praise and reproof) on mildly and moderately retarded and institutionalized children.

Subjects

The subjects used in the present study were twenty retarded children enrolled at the Denton State School, Denton, Texas. The group of twenty subjects consisted of ten mildly retarded children and ten moderately retarded children. The subjects ranged in chronological age from 14 years to 18 years and in I.Q. scores from 40 to 64. The ten mildly retarded children ranged in chronological age from 14 years to 16 years and in I.Q. scores from 54 to 64. The ten moderately retarded children ranged in chronological age from 16 years to 18 years and in I.Q. scores from 40 to 48.

The subjects resided in their respective cottages, assigned to them by the institution, on the basis of institutionally determined I.Q. scores as a criterion for degree of mental retardation (that is, moderately retarded 16 to 18

year olds lived in a separate cottage as did mildly retarded 14 to 16 year olds).

No attempt was made in this study to manipulate the variability of quality, form, or extent of brain damage that may have been revealed in the case folders at the institution. For example, this study did not make use of electroencephalogram reports or gross and "routine" neurological examinations. The sole criterion for degree of retardation was institutionally determined I.Q. scores.

The number of males and females were equally distributed within each degree of retardation in order to control possible variations due to sex. There were five male and five female subjects in the mildly retarded category; the same existed in the moderately retarded category.

Experimental Design

In order to control for individual differences possibly favoring one reinforcement group over the other, with respect to the criterion score, the enrollment cards for each cottage (mild and moderate) were shuffled, and ten subjects were chosen from each cottage population to be represented in the study. The ten mildly retarded subjects, identified by their enrollment cards, were then shuffled and distributed into two equal groups of five each. Then a toss of a coin was used to designate which subgroup was to be used for one

of the two reinforcement conditions. The same procedure was employed for the cottage enrollment cards of the moderately retarded subjects. The sorting resulted in the assignment of five individual subjects into each of four experimental treatment combinations.

In studying the two independent variables in a single experiment, the 2 X 2 factorial design was utilized. The modification of behavior must always be considered as potentially interacting with any independent variable and must be judged by the probable effects of such interactions. The factorial design, therefore, provides the experiment with greater efficiency, more knowledge, and a higher degree of precision, still obtainable by the same number of observations.

The principal factors involved were degree of retardation (mild and moderate) and nature of reinforcement (praise and reproof) resulting in four experimental conditions. Five subjects were included in each of the four experimental design sub-groups, identified as follows: mildly retarded subjects receiving praise, mildly retarded subjects receiving reproof, moderately retarded subjects receiving praise, and moderately retarded subjects receiving reproof.

The criterion score, synonymous with the dependent variable, was the mean average of "two" digits crossed out on the cancellation task, over a five-trial period; the means for the group of five subjects, with its unique treatment, will be the mean placed within the factorial design.

A diagrammatic representation of the basic design is outlined in Figure 1.

		Nature of Reinforcement	
		Praise	Reproof
Level of Retardation	Mild	N=5	N=5
	Moderate	N=5	N=5

Fig. 1--Diagram of the factorial design

Procedure and Task

Performance of the subjects was measured in terms of a numerical cancellation task consisting of 160 digits containing 40 "two" digits. An example of the task is presented in the appendix. The subjects were ushered into a room, away from the regular routine of the cottages, containing a table and two chairs. The experimenter sat to the left and somewhat behind the subject. Instructions began by calling the attention to the numeral that he was to cancel out, which was located at the top of the page. The subject was then instructed to begin the task at the left of the page, on the top line, and cancel out all the "two's" in each line. The subject was given a pencil, told not to talk to the

experimenter, and to begin the task. All subjects received either praise or reproof conditions; half of the mild and moderate retardates received praise, the other half, reproof.

During the performance of the task, verbal statements or utterances were given at ten, twenty, forty-five, and fifty-five seconds, the trial lasting sixty seconds. After the subject completed the first trial, he was instructed as follows: "Okay, let's try it again."

Each subject was administered five successive trials. The list of verbal statements, operationally defined as praise and reproof conditions, are as follows:

<u>Seconds</u>	<u>Reproof</u>
10	1. You are going too slow.
20	2. You can do better than this.
45	3. Still not too good.
55	4. Not very good.
<u>Seconds</u>	<u>Praise</u>
10	1. That's right--real good.
20	2. Very good.
45	3. You're doing real well.
55	4. Real good.

The subjects who received reproof conditions were administered an extra trial consisting of praise conditions in order to neutralize the reproofing effects.

CHAPTER IV

RESULTS

The following chapter was designed to reveal the pertinent results of the study and a statistical analysis of those results.

Within this study, each subject performed on five trials to complete the total required task. The mean scores, using correct responses, were then tabulated for each subject on the five trials. The differences in the mean scores of the subjects were then measured in terms of the treatment effects; comparing the mean scores of the correct responses for the various treatment combinations, of course, was the primary interest. In order to reveal the mode whereby the treatment conditions interacted and to determine whether there was a relationship between the variables employed (that is, the acceptability or unacceptability of the proposed hypotheses) the analysis of variance was utilized as the prime statistical schema.

The individual trial scores, for the twenty subjects, as well as the mean scores of the five test trials for each subject, are reproduced in the appendix. The means and standard deviations of the criterion scores (that is, the number of

digits correctly cancelled out on the cancellation task), made by the five subjects assigned to each unique experimental condition, are revealed in Table I. In the margins of Table I, the means and standard deviations for each level of the two main treatments are shown. The column in Table I defined as "Combined Levels of Retardation" reveals the mean number of correct responses obtained under each level of retardation without the differential influence of the nature of reinforcement. The standard deviations of the main effect scores are also included. The column in Table I defined as the "Combined Verbal Treatment" reveals the mean number of correct responses obtained from each condition of reinforcement with level of retardation held constant; the standard deviations of the scores may also be observed.

TABLE I
MEANS AND STANDARD DEVIATIONS OF CRITERION SCORES
FOR THE TREATMENT CONDITIONS

Nature of Reinforcement	Level of Retardation				Combined Verbal Treatment	
	Mild		Moderate		M	SD
	M	SD	M	SD		
Praise	27.96	9.47	18.92	3.51	23.44	8.45
Reproof	33.60	4.24	21.92	10.37	27.76	9.84
Combined levels of retardation	30.78	7.86	20.42	7.88		

The working hypotheses, given in Chapter I, include predictions relative to the measures employed for controlling variation in the study (for example, levels of retardation), and this can also be observed in Table I.

The various hypotheses underlying the study were tested statistically by the analysis of variance technique. Evidenced in Table II is the summary of the analysis of variance results.

TABLE II
SUMMARY TABLE OF THE LEVEL OF RETARDATION X NATURE
OF REINFORCEMENT ANALYSIS OF VARIANCE

Source of Variation	df	Sum of Squares	Mean Square	F-Ratio
Level of Retardation	1	536.6480	536.6480	7.542*
Nature of Reinforcement	1	93.3120	93.3120	1.3115
Within Cells	16	1138.368	71.1480	
Level Retardation X Nature of Reinforcement	1	8.7120	8.7120	.122+
Total	19	1777.04		

*Statistically significant at the $p \leq .05$.

The hypotheses underlying the study will be analyzed consecutively and appropriate references made to Table I, Table II, and Figure 2 as needed. The hypothesis of precedence, Hypothesis 1, stated, in essence, that the performance of mentally retarded subjects, with respect to the reinforcing

verbal conditions of praise and reproof, depends on the degree or level of retardation (i.e., there would be a significant interaction between level of retardation and nature of reinforcement). The statistical evidence appropriate to Hypothesis 1 was obtained in terms of Level of Retardation X Nature of Reinforcement interaction. Table II reveals, in the F-ratio column, that statistically nonsignificant results were found with respect to the interaction ($F=.122$). The negligible results indicated that the relative effects of the different qualities of reinforcement were not significantly different for the two levels of mental retardation. Overall, Hypothesis 1, lacking with respect to statistical significance, was rejected.

Table I also reveals the nonsignificant interaction effects by comparing the four treatment combination means. The cell means are given more graphic illustration in Figure 2.

Hypothesis 1(a) stated that mildly retarded children would perform better under verbal reproof than under verbal praise. The mean scores related to this hypothesis which can be found in Table I and Figure 2 are as follows: mean for praise condition 27.96 and mean for reproof condition 33.60. Preliminary examinations of the mean scores reveal a trend toward the predicted results due to the reproof mean (33.60) exceeding the praise mean (27.96) by the value of 5.64. However, the statistical test related to the significance of the

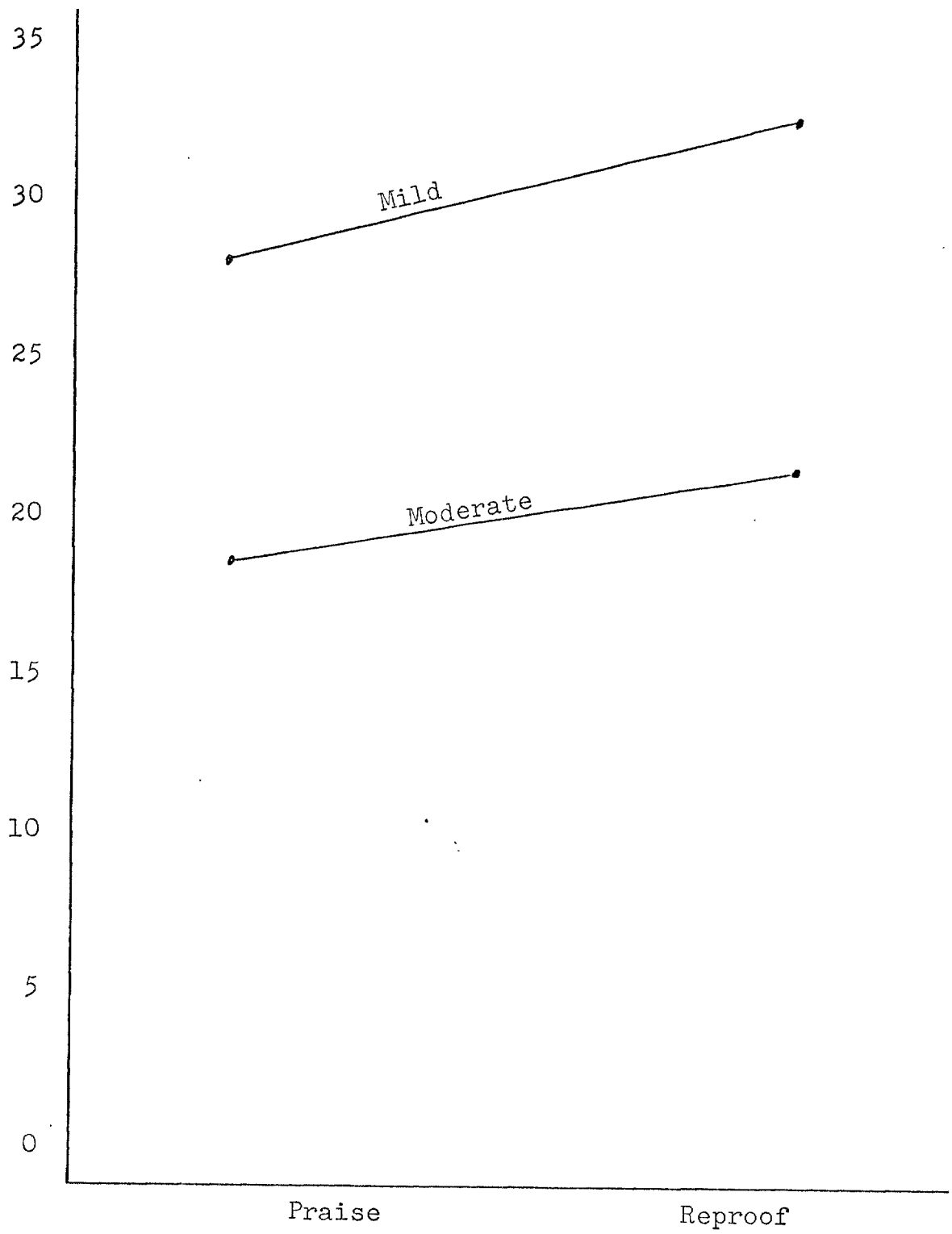


Fig. 2--Nature of reinforcement by level of retardation interaction.

nature of reinforcement yielded an F-ratio of 1.311, therefore, Hypothesis 1(a) lacks statistical support and must be refuted on these grounds. Accompanying these results is the implication that there was no true difference between the relative effects of verbal reinforcement with respect to mildly retarded subjects.

Hypothesis 1(b) states that moderately retarded subjects will perform better under verbal praise than under verbal reproof. The mean scores related to Hypothesis 1(b) which can be observed in Table I and Figure 2 are as follows: mean for the praise condition 18.92 and mean for reproof condition 21.92. Even without the use of a statistical schema, one can see by the numerical scores that no trends are exhibited in the direction of Hypothesis 1(b). The apparent inferiority of the verbal praise condition can be seen from overt observation of Figure 2. Moreover, in examining the statistical test employed related to the significance of the nature of reinforcement, it can be seen that the F-ratio yielded 1.311. Therefore, Hypothesis 1(b) lacks statistical support and must be rejected on these grounds. Along with these results one must accept the implication that there was no true difference between the relative effects of reinforcement with respect to moderately retarded subjects, and that what difference did occur was a result of chance alone.

Hypothesis 2 stated that the performance of mildly retarded children will be superior to that of moderately retarded children regardless of the nature of reinforcement employed (that is, praise or reproof). In analyzing Figure 2 there was the obvious indication that mildly retarded subjects performed better than moderately retarded subjects. This judgment was supported by the significant F-ratio of 7.42, which was significant beyond the .05 level. Observations of Figure 2 reveal that the effect of reinforcement was independent of the levels of retardation. No significant interaction between the two variables existed. The experimental effects of verbal praise appeared to have slightly reduced the overall responses of subjects regardless of the level of retardation. The effects of verbal reproof seemed to have been a motivation to the subjects, slightly increasing the overall performance of subjects within both levels of retardation.

To reiterate, the statistical results failed to support Hypotheses 1, 1(a), and 1(b), but supported Hypothesis 2.

CHAPTER V

DISCUSSION

The present chapter contains theoretical comparisons and differences of the major results of this study as it is related to previous research findings and implications. Also included are discussions of the results and problems related to the criteria.

Interaction Effects Between Level of Retardation and Nature of Reinforcement

In view of the obvious theoretical relationship that exists between some of the postulates and hypotheses proposed by McCandless and the tested hypotheses and findings of the present study, an attempt at comparing findings of the present study with hypotheses initiated by McCandless seem pertinent and vital, especially with respect to the generation of new hypotheses. Admittedly, however, such an attempt is cumbersome, inexact, requires some degree of substitution, and must make use of the terminology employed by McCandless as well as the findings of the present study as they exist.

The social learning theory advanced by Rotter and his associates reasons that the child's previous history, with

respect to success and failure, predetermine the subject's responses to novel situations (7). McCandless carries this reasoning further by hypothesizing that criticizing a subject, which seems to approximate verbal reproof conditions employed on subjects in the present study, or failure may serve as an extremely proficient motivating device for "bright" or "able" children, while these same conditions may "discourage and handicap" the subject who is "already doing poorly" (6). Moreover, McCandless states that ". . . the bright child expects to succeed, hence, success and praise do not surprise him or raise him to new levels of performance." Findings of the present study may be used to reveal whether the "bright child" raised or elevated his performance as a result of experimental treatments of praise. However, it may be noted that the present study utilized mildly retarded subjects which is the nearest parallel to the McCandless term "bright or able child" and the approximation in the present study related to the McCandless description "the child who is already doing poorly," by necessity, is the group of moderately retarded subjects. Admittedly, obvious discrepancies exist with respect to subjects utilized in comparing those subjects implied by McCandless and subjects employed in the present study. Nonetheless, Figure 2 reveals that the Verbal Condition of praise did not significantly increase the performance of mildly retarded subjects over mildly retarded subjects that received

conditions of reproof; which is what McCandless may have predicted due to his statement "hence success and praise [of the 'bright child'] do not raise him to new [significant] levels of performance." Actually, though, the mildly retarded subjects could possibly have increased their performance under the effects of praise, and this behavior lacked detection due to the fact that the statistical schema and design employed was not sensitive to type of investigation, nor were the effects of praise alone on the mildly retarded children included in the hypotheses found in this study (6).

McCandless also states that "punishment [of the 'bright child'] is so severe that he redoubles his efforts to avoid encountering it [criticism or reproof] again." If, by what McCandless terms "redoubling his efforts," he feels the "bright child" (the mildly retarded child in the present study) increases his efforts as a result of conditions of reproof to a statistically significant degree beyond the conditions of praise, then the present findings of this study would refute this implication. The treatment conditions of reproof with respect to the present study did not raise the performance level of the mildly retarded subjects to a statistically significant degree. The statistical test related to the significance of the nature of reinforcement yielded an F-ratio of 1.311, which is not statistically significant and is accompanied by the implication that there

was no true difference between the means of the mildly retarded subjects who received treatment conditions of praise and reproof (6).

McCandless also reports that "criticism [reproof] discourages and handicaps the child who is already doing poorly." Moreover, he states that "the failing child expects failure and criticism [verbal reproof]" and that the effect of these conditions would have "little effect except to reduce his efforts." There was no evidence in the present study that could lend support to the hypothesis by McCandless that "criticism [verbal reproof] discourages and handicaps the child who is already doing poorly" (the moderately retarded group in the present study). In fact, the experimental effects of reproof were slightly higher for the moderately retarded subjects (mean for reproof 21.92; mean for praise 18.92) but are not statistically significant.

Evaluation of Results

The results seem to parallel those of Wolfensberger's (10) studies which revealed negligible effects of the reaction times of mental defectives due to either reward or punishment, whether concrete or indirect. However, one obvious but nonstatistical difference, with respect to the present study, was the possible superior effect of reproof conditions over those defined as praise. A significant factor which could account for the nonsignificant results and promote variance in the dependent

variable of both Wolfensberger's study and the present study is the manner in which reinforcement was programmed. Wolfensberger rewarded the subjects in his study on a fixed-ratio schedule, that is, one out of every five trials. The present study was programmed on a fixed-interval basis, i.e., every 10, 20, 45, and 55 seconds. The possibility exists that speed of responding, upon which the present study's criterion for a 60-second trial was based, was independent of reinforcement. Baumeister and Ward (1), for example, feel that reinforcement must be contingent upon the speed of each response in order that the subject's performance would determine whether or not he would be rewarded.

The Problem of Criterion

The standard deviation of the mildly retarded subjects who received the praise condition (SD, 9.47), and standard deviation of the moderately retarded subjects who were administered the reproof condition (SD, 10.37), probably resulted from multiple causes. But, heading the list of possibilities could be theories proposed by Harlow and associates who claim that studies supporting incentive (or reinforcement) variations are rarely correlated with the subject's value system. If studies such as those of Witryol (9) and Harlow (5) reveal in their future investigations that the incentive scales for retarded subjects are intense and extremely varied, then the institution housing retarded subjects would have to undergo

a long and intensive individual investigation in order to discover the most effective means whereby to control and predict the behavior of retarded subjects. Also, if this is true, the criticisms related to the overemphasis of methodology of learning at the expense of individual differences would accompany these findings.

The Problem of Discrimination

A number of studies have failed to find significant differences in the discrimination abilities among mental retardates (8). The findings of the studies, related to discrimination and reinforcement, in Chapter II, seemed to suggest that mildly retarded cultural-familial children do not show a discrimination deficit but that brain-injured retarded subjects do reveal significant differences. One of the significant factors that could have influenced the present study was the discrimination of subjects being adversely hampered by organic impairment. Although no subjects were eliminated from the study due to overtly obvious organic impairments, Goldstein (2, 3, 4) reveals that brain injury can be independent from the site of injury and may adversely affect the performance of subjects that have been institutionally diagnosed as being void of organic impairment.

Observations of Raw Data

When analyzing the raw data containing the twenty-five test trials for the group of five moderately retarded subjects under verbal reinforcement conditions of reproof, it was found that 160 digits received cancellation marks very close to the digit; however, these responses were not touching the digit and can be described as "near misses" (all such responses that occurred, regardless of level of retardation or treatment condition, were counted as correct responses).

The twenty-five test trials for the group of five moderately retarded subjects who received praise conditions of reinforcement were then examined in order to determine whether the quantity of "near misses" was an underlying characteristic among the moderately retarded group disregarding the effect or reinforcement. This group had made thirty-seven "near miss" responses.

The number of cancellation marks neighboring or adjacent to the appropriate digit (that is, near misses) were observed among the five moderately retarded subjects under the reinforcement conditions of reproof and the individual "near misses" for each subject are as follows: 28, 1, 26, 0, 105. For the moderately retarded subjects who received the praise condition of reinforcement, the observed phenomena occurred thusly: 28, 0, 0, 0, 9.

These qualitatively unique findings were observed from the raw data after the study was completed. Therefore, obviously, no hypothesis concerning this phenomena was suggested, postulated, or statistically tested. The aftermath impression or implication that was derived is that the phenomena occurred to a greater extent numerically with the moderately retarded subjects under the verbal reinforcement conditions of reproof.

An example of the phenomena as it existed in one of the subject's trials can be seen in the appendix.

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CHAPTER VI

SUMMARY

The study was designed to determine the relative effects of two qualities of verbal reinforcement (praise and reproof) on mild and moderately retarded children.

The study utilized twenty mentally retarded subjects enrolled in the Denton State School, Denton, Texas. The subjects ranged in chronological age from fourteen years to eighteen years and in I. Q. scores from forty to sixty-four. With respect to sex affiliation, there were ten males and ten females; both the mildly retarded and the moderately retarded groups had five males and five females each. The institutionally determined I. Q. scores were used in classifying the level of retardation and other means, such as electroencephalograms or "gross" neurological examinations, were not used in the selection of subjects. Nor did this study attempt to control or hold these variables constant. Subjects were randomly assigned to the treatment conditions.

For studying the relative effects of the two independent variables, a 2 X 2 factorial design was utilized. The statistical results were analyzed in terms of the analysis of

variance revealing the two main treatments and conditions of the main treatments. The factors involved were nature of reinforcement (praise and reproof) and level of retardation (mild and moderate) resulting in four experimental conditions. Of the ten mildly retarded subjects, five subjects were randomly assigned to receive praise and five to receive reproof. The same procedure was employed for the moderately retarded subjects.

Performance of the subjects was measured in terms of a numerical cancellation task, designed by the experimenter, consisting of 160 digits containing forty "2" digits. The criterion scores and dependent variable was the mean number of correctly cancelled "2's" over a five trial period.

During the task verbal statements or utterances were given at ten, twenty, forty-five, and fifty-five seconds, the trial lasting sixty seconds. An example of the reproof condition was the statement "not very good" and a representation of praise is revealed in the phrase "you're doing real well." Between each trial the statement "okay, let's try it again" was emitted. The subjects receiving reproof conditions received an extra trial consisting of praise statements in order to neutralize the reproof conditions.

The hypotheses underlying the study were tested and decisions made on the basis of the results.

Hypothesis 1 proposed that the relative superiority of types of verbal reinforcement (praise or reproof) would depend on the level of the retardation of the child (mild or moderate); that is, there would be a significant interaction between levels of retardation and nature of reinforcement. The implications of this hypothesis resulted from studies related to the expectations of the subject based on past histories of development, i.e., moderately retarded subjects were thought to have had suffered more environmental setbacks than mildly retarded children. Therefore, moderately retarded children's performance would be increased by praise and mildly retarded children by reproof. The mean scores of the four treatment combinations and statistical analyses of these means yielded nonsignificant results. Therefore, Hypothesis 1 was rejected.

Hypothesis 1(a) stated that the mildly retarded children would perform better under verbal reproof than under verbal praise. Preliminary examination of the mean scores revealed a slight trend toward the predicted results but lacked significant statistical support. On the basis of results, Hypothesis 1(a) was rejected.

Hypothesis 1(b) stated that the moderately retarded subjects would perform better under verbal praise than under verbal reproof. The mean score for the moderately retarded subjects under verbal conditions of praise was lower than

the mean score for reproof. On the basis of these results the stated empirical hypothesis was rejected.

Hypothesis 2 stated that the performance of mildly retarded children would be superior to that of moderately retarded children regardless of the nature of verbal reinforcement employed (praise or reproof). The mean scores of the mildly retarded subjects, under both verbal reinforcing conditions, were significantly higher than the mean scores of the moderately retarded subjects. The results yielded a significant F-ratio of 7.42, which was significant beyond the .05 level. On the basis of these results, the stated hypothesis was accepted.

The experimental effects of verbal praise appeared to have slightly reduced the overall performance of subjects regardless of the level of retardation. The effects of verbal reproof appeared to have been motivation to the subjects, slightly increasing the overall performance of subjects within both levels of retardation.

APPENDIX

2

DIGIT CANCELLATION TASK

1	2	5	8	7	9	6	2	0	3
2	4	1	2	8	9	0	9	2	6
5	0	8	7	2	4	2	3	3	2
1	4	2	4	6	2	1	5	7	3
3	0	2	6	9	7	8	5	2	1
6	2	9	0	9	8	2	1	4	2
2	3	3	2	4	2	7	8	0	5
3	7	5	1	2	6	4	2	4	3
1	2	5	8	7	9	6	2	0	3
2	4	1	2	8	9	0	9	2	6
5	0	8	7	2	4	2	3	3	2
1	4	2	4	6	2	1	5	7	3
3	0	2	6	9	7	8	5	2	1
6	2	9	0	9	8	2	1	4	2
2	3	3	2	4	2	7	8	0	5
3	7	5	1	2	6	4	2	4	1

2

EXAMPLE OF "NEAR MISSES"
SAMPLE FROM MODERATELY RETARDED, REPROOF GROUP

1	2	5	8	7	9	6	7	0	3
7	4	1	8	8	9	0	9	2	6
5	0	8	7	2	4	2	3	3	2
1	4	2	4	6	2	1	5	7	3
3	0	2	6	9	7	8	5	2	1
6	7	9	0	9	8	7	1	4	7
7	3	3	7	4	7	7	8	0	5
5	7	5	1	7	5	4	7	4	1
1	7	4	8	7	9	6	2	0	3
2	4	1	2	8	9	0	9	2	6
				7		7			7
1	4	2	4	6	2	1	3	7	3
0	0	2	6	0	9	3	0	2	1
6	2	9	0	9	8	2	1	8	2
7	3	3	2	4	2	7	8	0	5
3	7	5	1	2	6	4	2	4	2

INDIVIDUAL SUBJECTS' RAW SCORES AND MEANS
ON THE DIGIT CANCELLATION TASK

MILDLY RETARDED, PRAISE GROUP

Subject	Trials					Mean
	1	2	3	4	5	
01	23	19	23	24	23	22.40
02	15	14	17	13	11	14.00
03	26	26	27	28	26	26.60
04	40	40	40	39	39	39.60
05	38	38	32	39	39	37.20

MILDLY RETARDED, REPROOF GROUP

Subject	Trials					Mean
	1	2	3	4	5	
06	39	40	36	37	38	38.00
07	34	35	37	35	33	34.80
08	35	35	38	39	40	37.40
09	26	25	26	28	28	26.60
10	29	31	31	33	32	31.20

MODERATELY RETARDED, PRAISE GROUP

Subject	Trials					Mean
	1	2	3	4	5	
11	16	18	24	19	17	18.80
12	16	13	15	14	12	14.00
13	18	16	17	17	15	16.60
14	29	29	26	24	13	24.20
15	22	20	22	22	19	21.00

MODERATELY RETARDED, REPROOF GROUP

Subject	Trials					Mean
	1	2	3	4	5	
16	36	35	35	28	39	34.60
17	16	17	16	13	11	14.60
18	11	10	14	13	15	12.60
19	28	37	36	38	34	34.60
20	15	11	11	14	15	13.20

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