VERBAL CONCEPT LEARNING AMONG THE DISADVANTAGED AS A FUNCTION OF STIMULUS PREDIFFERENTIATION

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ABSTRACT

VERBAL CONCEPT LEARNING AMONG THE DISADVANTAGED AS A FUNCTION OF STIMULUS PREDIFFERENTIATION

By

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The present study examined the effect of relevant stimulus pretraining on the acquisition of easy and difficult verbal concepts by disadvantaged Ss. Eighty Negro 7th graders who were matched on IQ, reading level, chronological age, and socioeconomic status were randomly assigned to one of four pretraining conditions, namely: equivalence labeling, distinctive labeling, observation, and no pretraining. Following pretraining, Ss were given a concept learning task in which they were required to indicate what common concepts a set of words referred to.

The results indicated a significant main effect due to pretraining. Equivalence labeling was superior to all other conditions in facilitating concept learning. Although significant differences did not occur in comparisons involving the other three pretraining conditions, trends indicate that the observation pretraining was superior to

distinctive labeling and no pretraining in promoting concept learning. Moreover, trends indicated that no pretraining was superior to distinctive labeling in facilitating concept learning.

Other results obtained indicated a multiplicative relationship between pretraining and concept complexity. The source of this interaction is related to the fact that Ss in the distinctive labeling condition learned more of the easy concepts, but a lesser number of difficult concepts than the no pretraining group. Moreover, the overall results indicated a significant interaction between pretraining, concept complexity, and trials.

Significant main effects were also observed for concept complexity, and trials. No significant interactions, however, were observed between pretraining and trials, or between concept complexity and trials.

The main conclusion which derives from the present findings is that verbal concept learning among the disadvantaged can be greatly facilitated by stimulus pretraining. Additional research was suggested to clarify the relationship between pretraining and other learning variables.

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To Jo and Paulette

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CHAPTER I

PROBLEM

Need

The basic assumption which undergirds most thinking in remedial or compensatory planning is that there is a discoverable relationship between an individual child's learning deficit, and the method of instruction by which he learns most efficiently. While there has been disagreement (De Hirsch, Jansky, and Langford 1965; Cohn, 1964; Frostig, 1965; Kirk and McCarthy, 1961; Harris, 1965) as to what are the proper methods and practices to pursue in remediating learning deficits, almost all have implicitly agreed that the "instructional method" is a significant variable. Unfortunately, there is little direct evidence which will permit rigorous conclusions to be drawn regarding the effect of a specific instructional technique on a specific learning deficit. This is a serious psychological and educational omission.

Moreover, while most of the theoretical and research efforts regarding instructional methods have been directed toward remediating learning disabilities among mental retardates with basic neurological and physical impairments, the findings have been generalized to other nosological or exceptional groups. This practice has been particularly evident in programs structured for the "educationally" and "socially" disadvantaged. It should be noted that most of the instructional techniques used in Head Start and Job Corp programs are slight variations of those used in remediating learning difficulties among the mentally retarded. While culturally and socially disadvantaged groups doubtlessly manifest many of the learning deficits common to the mentally retarded, such groups may have deficits which are unique to their social condition, and therefore, may require special instructional techniques.

Recent psychological research (Bernstein, 1961; Deutsch, 1963; John, 1963) has suggested that one of the most critical factors which delineates the culturally and socially disadvantaged from other groups is concept deficiency. Further, other research (Zigler and DeLaby, 1962) has demonstrated that this exceptional group shows difficulty in attaining or learning concepts. However, in spite of the commonality of these findings, little research is available which concerns the relationship between specific instructional methods and the concept deficiencies which culturally and socially disadvantaged groups manifest.

The need to expand educational and psychological technology and theory with respect to the "socially and educationally deprived" is exacerbated by the fact that his group comprises a significant proportion of the national school population. In 1950, one child out of every ten in the fifteen largest cities in the United States was educationally deprived (Riessman, 1962, p. 1). By 1960, this figure had risen to one in three. From all indications this trend is continuing, and by 1970, it is estimated that there may be one deprived child for every two enrolled in the large city schools (Riessman, 1962). Among the most salient implications which these figures suggest is the need for efficient methods by which concepts can be effectively taught.

Stimulus predifferentiation has been shown to be an effective technique for improving concept learning among subjects of normal intelligence (Norcross, 1958; Norcross and Spiker, 1957; Schaeffer and Gerjuoy, 1955; Spiker, 1956; Spiker and Norcross, 1962). Moreover, Prehm (1966) has recently shown that verbal labeling is an effective procedure for facilitating the acquisition of geometric concepts among disadvantaged subjects. However, the usefulness of stimulus predifferentiation in facilitating the learning of verbal concepts has not been investigated. The failure to examine the relationship between verbal concept learning and stimulus predifferentiation has precluded the development of a technique which might be useful in ameliorating the conceptual deficits of these children. The growing number of disadvantaged youngsters in the nation's school population, and the urgent need to develop new techniques for teaching these youngsters make the investigation of stimulus pretraining important.

Purpose

The purpose of this study is to examine the acquisition of verbal concepts among the disadvantaged as a function of different stimulus pretraining procedures. More specifically this study will focus on the acquisition of easy and difficult verbal concepts as a function of three types of stimulus pretraining methods: namely, distinctive labeling, equivalence labeling, and observation.

Theory

Stimulus predifferentiation in general refers to stimulus practice designed to facilitate transfer in a subsequent learning task. Transfer, in consonance with this definition, is predicated on the assumption that the stimuli which subsequently become associated with new responses have been predifferentiated in the pretraining task. Two theories have been suggested to account for predifferentiation as a factor in facilitating transfer, namely the acquired distinctiveness and equivalence of cues formulation (Dollard and Miller, 1950; Goss, 1955), and the differentiation theory (Gibson and Gibson, 1955). Although these two theories provide different explanations for the influence of predifferentiation, they lead to similar predictions. However, Gross' extension of the Dollard and Miller position seems to provide a better explanation of the influence of stimulus predifferentiation on verbal concept learning than the Gibson and Gibson or Dollard and Miller positions.

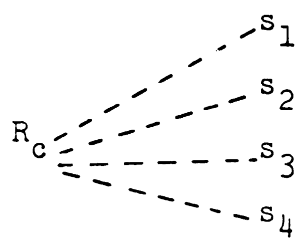
The differentiation theory of Gibson and Gibson suggests that organisms learn to distinguish various components which are inherent in a stimulus. Predifferentiating stimulus materials prior to a learning task directs the organism attention to those components of the stimulus situation which are relevant for the learning task. Stimuli, therefore, become more distinct or equivalent not as a result of some "enrichment" process, but as a result of differentiation.

Dollard and Miller (1950) have postulated that "attaching a common label to dissimilar objects gives them a certain learned equivalence increasing the extent to which instrumental and emotional responses will generalize from one to the other . . . conversely, attaching distinctive cue-producing responses to similar objects tends to increase distinctiveness." The assertion here is that attaching labels to stimuli is an enriching, cue-producing process.

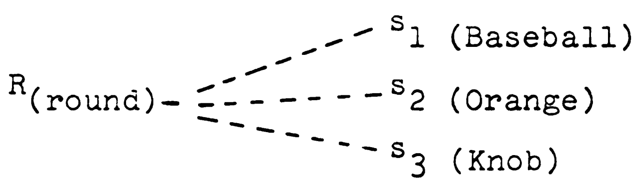
Goss (1955) extended the Dollard and Miller formulation in two directions by (1) postulating that the acquired equivalence and distinctiveness of cues model is a special case of an interaction between external cues, response-produced cues and instrumental responses; and (2) by applying this model in conjunction with known principles of learning and retention postulates certain relationships between the acquisition of cue-producing responses and the subsequent learning of instrumental responses. He has suggested that with respect to stimulus similarity the more similar the external cues, the smaller will be the contribution of the common mediating responses. Conversely, the more dissimilar the external cues, the more dependent Ss will be on a common mediating response.

Although Goss' extension of the Dollard and Miller position was developed to account for discrimination, motor learning, and to some degree generalization, it appears to be relevant for verbal concept learning. However, in order to extend this theoretical formulation to verbal concept learning, several definitions, assumptions, and parallels must be given.

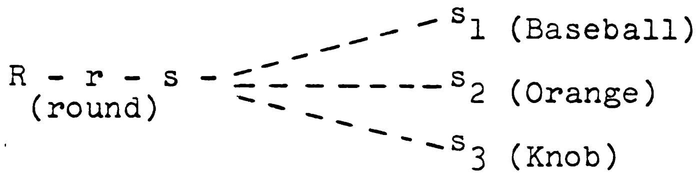
The first requirement necessary to extend Goss' theoretical model to verbal concept learning is to postulate a definition of concept learning and more particularly of verbal concept learning. Concept learning in general may be defined as the acquisition of a common response to a number of different objects or stimuli. Diagrammatically, this definition of concept learning per se can be represented in the following manner:



In traditional concept learning experiments, the stimulus arrays have been geometric designs from which subjects were required to deduce rules for forming concept classes or attributes. However, it is possible to place verbal concept learning in this diagrammatical representation with little or no modification. Given that verbal concept learning is the acquisition of a common verbal response to a number of structurally different, but conceptually related words, a verbal concept may be represented by:



Concept learning when defined in the above way is said to be facilitated by mediational processes which are induced in an experimental situation or which are assumed to be products of the <u>S's</u> extra-experimental experiences. Thus, the schematic representation of concept learning then becomes:



This mediating process (r - s -) according to some theories is the *sine qua non* of concept learning and facilitates acquired equivalence. Given a verbal concept learning task of the kind defined above, the structure of English words, and data from word association research, it becomes possible to relate Goss' theoretical formulation to verbal concept learning.

Goss has postulated that: (1) the more similar the external cues (stimuli, words, etc.), the smaller will be the contribution of mediating responses, and (2) the more dissimilar the external cues, greater will be the contribution of the mediating responses. In view of the fact that there are very few sets of English words which are structurally similar and which at the same time are conceptually similar, Goss' first postulate would appear to have limited application in verbal concept learning. Thus, it becomes necessary to deal only with the second postulate.

The second postulate suggests that when stimulus objects including words are physically or structurally dissimilar, learning and concept formation is dependent on mediational processes. Consider the following verbal concept:

Word Group	Baseball Fang Paste Sugar	= concept "white"

According to Goss' second postulate, the formation of this concept should be heavily dependent on a common mediating process since the stimulus words are structurally different. Assuming that word association norms indirectly reflect the influence of mediation processes, there is some evidence to support this contention.

Underwood and Richardson (1956) have demonstrated that verbal concepts are formed more easily from words that have high dominance than from words of low dominance.[1] The explanation of this difference is based on the assumption that the high dominant words have a common mediation process as a result of their frequent use and association in this culture, while the low dominant words do not since they are infrequently associated. Based on the postulation of Goss, and the evidence provided by Underwood and Richardson, it appears that one of the most important limiting variables in verbal concept learning is the mediating process. Given that mediating processes can be effectively manipulated, verbal concept learning can be facilitated.

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[1]Dominance refers to the frequency with which a common response is given independently to a set of words in a free association task.

The Relevance of Stimulus Predifferentiation for the Theory of Verbal Concept Learning and for Aiding the Disadvantaged

Stimulus predifferentiation theoretically would appear to be a useful technique for influencing verbal concept learning. Preliminary activity with stimuli which are to be used in subsequent learning tasks might possibly provide the sufficient condition for the development of what has been called the limiting variable in verbal concept learning, namely mediation processes. Verbal labeling and other kinds of preliminary activity with the stimulus materials should provide not only response-produced cues, but stimulus familiarity as well.

That disadvantaged subjects experience difficulty encoding stimulus materials and forming concepts is well documented (Covington, 1962; Deutsch, 1963; Jensen, 1963; John, 1963; Katz and Deutsch, 1963). These difficulties in part have been attributed to the very narrow range of experiences to which these subjects have been exposed. As a result of these narrow experiences, it has been suggested that disadvantaged subjects lack the mediating processes and stimulus familiarity which are required in mastering a structured conceptual task. Given that the absence of useful mediating processes is the chief cause of concept learning difficulty among the disadvantaged, stimulus predifferentiation would appear to offer a unique possibility for assuaging this problem.

Hypotheses

Broadly interpreted the theoretical positions of Dollard and Miller, and Goss imply that when stimulus predifferentiation promotes accurate cue utilization relevant mediating processes develop and postive transfer is facilitated. Research with normal and retarded subjects suggests that various types of stimulus predifferentiation differ widely in the degree to which positive transfer is facilitated.

In consonance with the theoretical implication and research findings, the basic hypotheses which will be examined in this study is that:

1. Verbal concept learning among the disadvantaged will vary as a function of the type of stimulus pretraining received.
2. Verbal concept learning among the disadvantages will vary as a function of concept complexity.

Goss has suggested that one dimension of the relationship between cue-producing, and instrumental responses is the interaction between the complexity of external cues or stimuli and type of stimulus predifferentiation. In consonance, with this assertion, it is hypothesized that:

3. Stimulus predifferentiation and concept complexity will interact.

Several ordered hypotheses can be deduced as corollaries from the theory. The theory suggests that a common mediating response is effective in facilitating transfer. Distinctive labeling of stimulus materials should produce the same number of mediating responses as labels used. Thus, the greater the number of mediating responses the greater the amount of inhibition and negative transfer. Equivalence labeling, on the other hand, should facilitate the development of one common mediating response for all stimuli given a common label. Therefore, it is hypothesized that:

4. Equivalence labeling will better facilitate the acquisition of verbal concepts among the disadvantaged than distinctive labeling.

Further, based on the theoretical assumption that distinctive labeling produces inhibitory mediators, the following hypotheses will be examined:

5. Observation will better facilitate the acquisition of verbal concepts among the disadvantaged than distinctive labeling.
6. No predifferentiation will better facilitate the acquisition of verbal concepts among the disadvantaged than distinctive labeling.

Moreover, since on _a priori_ grounds it appears that equivalence labeling provides more useful cues than either observation or no pretraining, these hypotheses will also be examined:

7. Equivalence labeling will better facilitate the acquisition of verbal concepts among the disadvantaged than observation.

8. Equivalence labeling will better facilitate the acquisition of verbal concepts among the disadvantaged than no pretraining.

Finally, since observation provides more useful cues than no pretraining, it is hypothesized that:

9. Observation will better facilitate the acquisition of verbal concepts among the disadvantaged than no pretraining.

Definition of Terms

The following terms were used in this study:

Disadvantaged - the term disadvantaged refers to subjects whose families fall in the low and lower-lower classes as measured by the Warner Social Index Scale and whose reading grade placement score is 1 to 3 years behind actual grade placement as measured by the *Metropolitan Achievement Test*, Form B.[1]

Distinctive Labeling - attaching a single meaningful verbal label to a single stimulus pattern.

Equivalence Labeling - attaching the same meaningful verbal label to several different stimulus patterns.

Observation - attending to stimulus patterns without the aid of verbal cues.

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[1]Deutsch and his associates (1967) have reported data which suggest that level of reading is a sensitive measure of deprivation. Moreover, most research on the disadvantaged which involves levels of reading suggest that the reading grade placement of these *Ss* is 1 to 3 grades below actual grade placement.

CHAPTER II

REVIEW OF LITERATURE

The effects of various types of predifferentiation on transfer are well established. However, the amount of transfer produced seems to very as a function of the type of predifferentiation technique employed. Arnoult (1957) has identified five categories of predifferentiation which have been used by investigators in verbal, discrimination, and concept learning. These categories are relevant stimulus-response, irrelevant stimulus, attention or observation, no pretraining, and relevant stimulus training. Since the focus of this study is on relevant stimulus and attention training only those studies pertinent to these two types of predifferentiation will be reviewed.

Review of Relevant Stimulus Training Research

The most important characteristic of this type of predifferentiation is that the stimuli which are used in the pretraining task are identical to those used in the transfer task. However, the responses used in the pretraining task are qualitatively different from those involved in the learning task. Several investigators have examined this type of predifferentiation as a factor in facilitating transfer.

Robinson (1955) in attempting to test the distinctiveness of cues hypotheses examined the effect of verbal labeling on discrimination learning. Three groups of 14 Ss were given three different kinds of predifferentiation training. One group, the distinctiveness group, learned distinctive verbal labels to 10 fingerprints; a second group, the equivalence group, learned one verbal label to the first five fingerprints, and a second verbal label to the other five prints; a third group of Ss, the Same-Different group, was required to compare the ten prints with other prints, and to indicate whether the ten standard prints were the same or different.

During the criterion task, all Ss were required to compare a set of prints with those which were used in the pretraining task. Those Ss with preliminary training were told that the prints used in the pretraining task would also be used in the criterion task; however, a fourth group, a no prior training, was not so instructed. The Ss in this group were told that the purpose of the experiment was to determine discrimination ability and that they were to make their judgments as quickly as possible.

Two measures, errors and latency, were used as dependent variables. In terms of errors in discrimination, the Same-Different group was superior to the other groups. Moreover, the distinctive labeling and equivalence groups were not significantly different. The no prior training group was significantly inferior to the distinctive, equivalence, and Same-Difference groups. No significant differences, however, were found among the four groups in terms of latency scores.

Another attempt to provide a test of the acquired distinctiveness of cues hypothesis through the use of relevant stimulus training has been conducted by Norcross and Spiker (1957). The stimuli were pairs of faces; pair A was female faces and pair B was male faces.

Three groups of Ss were differentiated with respect to pretraining experience. Subjects in Group R were given only Pair A and learned to say the name "Jean" each time one member was presented and "Peg" each time the other member was presented. A second group, Group I, was given only pair B and learned to say "Jack" each time one member was presented and "Pete" each time the other member was presented. Subjects in Group D were also given pair A. However, they learned to say "same" when the two pictures were identical and to say "different" when both members were presented together.

Immediately following pretraining the transfer task was administered. This was identical for all Ss and involved having Ss select the correct faces from among faces which had not been used in the pretraining task.

The response measure was the number of correct choices in 30 trials of the transfer task. The difference between the means of Groups R and I was 3.00 with a t-ratio of 1.96 ($p= .05$). The Group R - Group D difference was 3.98 with the t-ratio equal to 2.36 ($p < .02$). There was, however, no significant difference between the D and I groups. These results tended to confirm previous findings that verbal labeling facilitates positive transfer.

Moreover, Cantor (1955) has examined the effects of three types of pretraining on the discrimination learning in preschool children. The Ss were 60 children from the State University of Iowa Preschool and the Iowa City Parents' Preschool. Ten of the subjects were 3 years old, 38 were 4 years old, 12 were 5 years old. An upper and lower age group were constituted and Ss within each age level were randomly assigned to three treatment groups.

Subjects in the relevant stimulus group received relevant stimulus training in which they learned to associate the names "Jean" and "Peg" with female faces. Subjects in the irrelevant group were given irrelevant pretraining involving male faces and the names "Jack" and "Pete." The attention group received no verbal labels, but Ss were required to attend to various parts of the relevant stimuli.

All Ss were treated identically in the transfer task. Subjects were required to choose one of two cars which had one of the faces which had been used in pretraining task mounted on the sides. The response measure used was the number of correct choices made in the transfer task.

Analyses of the transfer task data revealed that the relevant stimulus group performed significantly better than did the irrelevant and attention groups. No significant difference, however, was observed between the irrelevant and attention groups.

Schaeffer and Gerjuoy (1955) conducted three experiments to test the contention that "naming" influences discrimination learning by providing auditory and proprioceptive stimulation which facilitates differentiation of the stimuli. In the first experiment, three groups of children were compared when one was presented with no names for the stimuli, another with similar names, and third with dissimilar names. No significant differences were observed. The second experiment was a repeat of the first with only two groups, a "no names" group, and a "dissimilar names" group. Again no differences were found. The third experiment was a repeat of the second without the instructions. In this experiment, a significant difference between the two groups was found in favor of the one which received the dissimilar names.

The authors interpret these data as indicating that names served to facilitate the acquisition of discrimination set without which solution did not occur. When instructions obviated the need for this set to be acquired during the experiment, naming had no effect.

Norcross (1958) in a partial replication of the Schaeffer and Gerjuoy study (1955) had Ss learn highly similar names for one pair of stimuli (pictures) and dissimilar names for a second pair. The transfer task, the same for all Ss required S to push a different one of four buttons to each of separately presented stimulus pictures. Norcross predicted that learning performance, in terms of correct responses, would be superior for the pair of stimuli with dissimilar names as compared with the pair with similar names.

The results obtained confirmed this hypothesis. The mean number of correct responses to the dissimilarly labeled stimuli was 20.20, while the mean number of correct responses of similarly named stimuli was 19.90. An examination of verbal responses during the transfer task revealed that 103 incorrect dissimilar verbal responses were given while 341 incorrect similar responses were made. The mean difference of 8.27 is significant at .001 level.

Norcross performed a second experiment to examine the possibility that the greater number of motor errors to the similarly named pairs occurred because the similar verbal cues were more inconsistently associated with their respective experimental stimuli than was true for dissimilar verbal cues.

Experiment II differed from the first experiment only in that S was corrected for misnaming in the transfer task, and was required to verbalize the correct name prior to the button pressing response. The results again revealed a difference in favor of the dissimilar named pair. A mean of 22.73 correct responses occurred to the pair with dissimilar names while a mean of 19.62 correct responses occurred to the pair with similar names.

Spiker in collaboration with Norcross (1962) has further examined discrimination learning as a function of stimulus predifferentiation in preschool children. The three groups differed in the kind of predifferentiation received in the pretraining task. Groups D1 and D2 learned appropriately to say "same" or "different" when presented with settings of the pictures. Group D1 had been shown the pictures in simultaneous settings while D2 had responded following successive, single presentations of the stimuli. Group N learned discrete names for the pictures.

An analysis of correct responses in 30 transfer trials indicated that in the later stages of learning Group N was significantly superior to either Group D1 or D2.

A further attempt to investigate the relative effects of certain kinds of verbal labeling has been carried out by Ellis and Muller (1964). Ten Ss were randomly assigned to each of 24 conditions of the experiment. Two levels of stimulus complexity (6 or 24 point random shapes), three kinds of predifferentiation (distinctiveness, observation, or equivalence practice) and four levels of practice (2, 4, 8, or 16 trials) were employed.

During predifferentiation training, Ss received one of the three types of predifferentiation. Subjects given distinctiveness practice were required to learn relevant meaningful labels to each of eight random shapes. Similarly, Ss given equivalence practice were given an equal number of pretraining trials; the label "wide" was learned for four shapes and the label "narrow" was learned for the remaining four shapes.

Subjects given observation practice were given the same number of predifferentiation trials except that they were given no labels to attach to the stimuli and were instructed only to inspect the shapes and differentiate among them. For the labeling groups each stimulus shape was exposed for a 4 sec. period consisting of a 2 sec. anticipation period and 2 sec. simultaneous presentation with the response. Labels were pronounced by S; correct anticipation and errors were recorded. The observation group observed the shapes for the same time interval as did the labeling groups.

Following predifferentiation training, all Ss were immediately given a recognition test which consisted of presenting S with 16 cards, each containing a set of five shapes mounted in a row. Eight of the cards contained a prototype, a shape learned or observed during predifferentiation, and the remaining four shapes on each card were variations of the prototype. On the remaining eight cards all five shapes were variations of the prototype. The Ss were instructed to point to a shape if they thought it was one which they learned or observed during predifferentiation training. Five types of responses were recorded: correct selection of a prototype shape, incorrect selection of a variation when a prototype was present; incorrect rejection of shapes when one of them was a prototype; incorrect selection of variation when all shapes were variations, correct rejection of all the shapes when all were variations.

The results revealed that with complex shapes, the distinctiveness group made more correct recognitions than the observation groups after 2, 4 or 8 trials. In short, when labels were attached to stimuli of high complexity, recognition was superior to that provided by observation practice; when labels were attached to stimuli of low complexity, recognition was poorer than that provided by observation practice. The interaction which the finding suggests is supported by a significant complexity X training interaction ($F = 3.95$).

Moreover, practice led to a reduction of incorrect rejection responses (IR) for all types of differentiation training and to a reduction of selection of variations when all shapes were variations (SIV) for the distinctiveness and observation groups. Similarly, practice led to an increase in correct rejection responses (CR) for distinctiveness and observation groups. No systematic changes occurred in SIV or CR responses with increasing amounts of equivalence training. The analysis of variance resulted in a significant variance for practice effects for all responses. Further, the distinctiveness and observation groups tended to make fewer SOV (selection of variations when the prototype was present) responses to either 6 or 24 point shapes.

A second experiment was performed to determine if positive transfer to an instrumental motor task would occur following practice under two conditions, distinctive labeling and observation. Fifteen Ss were assigned to each of two conditions of the experiment. One group received distinctiveness training and the other received observation, identical to that given in the first experiment. Following predifferentiation training, Ss were given a criterion task which required them to learn to press a switch for each of the eight shapes they had labeled or observed. Correct responses and latency were the response measures used.

The analysis of the data revealed that Ss given distinctiveness practice in labeling 6 point shapes were superior in the acquisition of a motor switching task when compared with Ss given practice in observing the shapes. An analysis of the latency data further confirmed this finding ($F = 6.53$, $p < .05$).

Ellis, Bessemer, Devine, and Trafton (1962) have examined the recognition of random tactual shapes as a function of distinctive, equivalence, and observation predifferentiation. The stimuli were eight random shapes selected from six point shapes scaled by Vanderplas and Garvin (1962). Sixteen sets of three shapes were prepared and used for the recognition task. In 8 sets, all three shapes were variations of the prototype; in the remaining 8 sets, two shapes were variations and the third the prototype.

The distinctiveness training group learned to label the random shapes; the equivalence training group was given an identical number of predifferentiation trials except that the label "wide" was learned for four shapes and the label "narrow" was learned for the four other shapes. A third group, the observation group, also was given six predifferentiation trials except that Ss in this group did not overtly apply verbal labels to the shapes and were instructed to inspect the shapes and differentiate among them.

Following predifferentiation, all Ss were immediately tested for recognition. This task consisted of presenting S with 16 sets of shapes and asking him to select shapes which were identical to those he had experienced in the predifferentiation task.

The response measures used were selections of prototype, selections of variation of prototype, and incorrect rejections of prototype. Only the group differences in prototype selections were found to be statistically significant ($F = 15.55$, $df = 2/42$, $p < .001$). Although no multiple comparisons were made, it appears that the equivalence group was significantly poorer than the observation and distinctiveness groups on this response measure. However, there was apparently no difference between the distinctiveness and observation groups. The mean number of prototype selections for the equivalence, distinctiveness, and observation groups respectively was 2.93, 4.27, and 4.40.

There have been several attempts to influence the acquisition of concepts by retarded Ss through the use of stimulus predifferentiation. However, most of these attempts have failed to reveal any significant influence on the performance of these Ss (Miller and Griffith, 1961; Dickerson, Girardeau, and Spardlin, 1964). Nevertheless, Prehm (1966) has demonstrated the effectiveness of verbal pretraining on the acquisition of concepts by disadvantaged Ss.

Twenty-seven high and twenty-seven low risk disadvantaged Ss, ranging in chronological age from four to seven years, were used in the experiment. Nine Ss within each risk group were randomly assigned to one of three pretraining conditions: a verbal, an attention, and a control condition. Those Ss in the verbal label group were told the names of the stimulus cards and were directed to sort them into two piles, saying the name of each as they placed it on the pile. Those in the attention group sorted the cards into two piles according to the relevant stimulus dimension, but were neither told, nor required to say, the names for the stimuli. Ss in the control group sorted the stimuli into two piles in an unsystematic fashion. All Ss sorted the cards into two piles three separate times, with the examiner shuffling the cards between each sorting. Ss were randomly assigned to receive pretraining on either set one or set two of the stimuli in Transfer Task 1.

Immediately following pretraining, Ss were presented with the experimental task. Each one was given a stake of five pennies and told that when he made a correct choice, the examiner would take one of his pennies from him. Pennies were withdrawn from Ss in order to prevent them from obtaining so many pennies that motivation would be reduced. Subsequent to reaching criterion on Transfer Task 1, each S was immediately given Transfer Task 2.

Errors and trials to criterion on each transfer task were the dependent variable. However, because of the high correlation ($r = +.98$) between trials to criterion and errors, error data were not analyzed.

The analysis of trials to criterion data indicated that the main effects of pretraining was statistically significant, indicating that performance varied as a function of the pretraining conditions. Secondary analyses of the data revealed that the verbal label group was significantly superior to the attention group or control group in trials to criterion. The attention group was significantly superior to the control group.

Review of Attention or Observation Training Research

Observation training involves requiring Ss not to make overt responses such as naming or labeling during the pretraining task. Subjects, however, are required to attend to relevant characteristics of the stimuli. Several studies alluded to in the previous section included observation or attention as one of the types of predifferentiation.

Cantor (1955) has examined the relative effects of attention training, irrelevant and relevant stimulus training on discrimination learning. Attention training consisted of having Ss attend to relevant parts of the stimulus materials (male and female faces). Relevant stimulus consisted of requiring some Ss to label female faces "Jean" and "Peg"; a second group of Ss was given irrelevant stimulus training in which they were required to label a set of male faces "Jack" and "Pete."

The analysis of the transfer data revealed that the relevant stimulus training group made significantly more correct choices than either the irrelevant training or attention groups. There was no significant difference between the attention and irrelevant training groups.

Ellis, Bessemer, Devine, and Trafton (1962) in a previously cited study examined the relative merits of attention, distinctiveness, and equivalence labeling on tactual shape discrimination. Analyses of the transfer tasks revealed that those Ss receiving equivalence labeling were significantly inferior to those receiving distinctive labeling and attention. There was, however, no significant difference between the distinctiveness and observation groups.

Further, Ellis and Muller (1964) have demonstrated that observation training is superior to distinctive labeling in facilitating discrimination of simple random shapes. Distinctive labeling, however, better facilitated discrimination of complex shapes when compared with observation or equivalence labeling groups. There was no significant difference found between the observation and equivalence group at any level of task complexity.

Lastly, Prehm (1966) has demonstrated that distinctive labeling was superior to attention training in facilitating the acquisition of simple concepts among disadvantaged Ss. The attention training group was also superior to a control group which received no training.

Discussion of Relevant Stimulus and Attention Training Research

Several conclusions regarding stimulus predifferentiation appear possible from the review of the preceding studies. The first conclusion which can be drawn is that when distinctive labeling is compared with observation in carefully controlled experiments, distinctive labeling is superior to observation in facilitating transfer. Moreover, it appears that distinctive labeling is also superior to equivalence labeling in promoting transfer. There appears, however, to be no difference between observation and equivalence labeling in the degree to which transfer is facilitated.

Although these results appear consistently throughout the literature, it should be noted that such findings are based on studies which involved discrimination learning and "normal" subjects. Because of this, caution must be exercised in generalizing these results to disadvantaged populations.

A second conclusion which emerges from the review is that for the most part researchers have not examined the prediction made by Goss (1955) concerning an interaction between stimulus predifferentiation and stimulus or task complexity. Only Ellis and Muller (1964) have examined this relationship. Their results confirmed this predicted interaction ($F = 3.95$ df 2/216, $p < .05$). Prehm (1966) did not examine this relationship in his research with disadvantaged Ss nor did Miller and Griffith (1961) or Dickerson, Guardeau, and Spradlin (1964) in their studies of predifferentiation. The failure to examine this relationship obfuscates any attempt to fully explore stimulus predifferentiation as an instructional technique.

Moreover, most of the studies reviewed here and those which abound in the literature have been concerned with stimulus predifferentiation as a factor in discrimination learning. A modicum of research has been done relevant to stimulus predifferentiation as a factor in concept and verbal learning. This is a serious shortcoming from an educational point of view since concept and verbal learning are the kinds of learning most frequently found in schools.

CHAPTER III

METHOD

Subjects

The Ss were 80 Negro 7th grade students who attended school in Baton Rouge, Louisiana, whose family socio-economic levels were in the low or lower-low category as measured by the Warner Social Index,[1] and whose reading grade placement as measured by the Metropolitan Achievement Test, Form B, was 1 to 3 grades behind actual grade placement. Forty of the Ss were females, and 40 were males. The mean IQ for Ss as measured by the Otis Group Intelligence Test, Form EM, was 89.6, while the mean CA was 12.4. Table 1 summarizes Ss' characteristics.

TABLE 1.--Subjects' characteristics.

Sex	Mean CA	Mean Socio-Economic Status	Mean Reading Grade Placement	Mean IQ
Male	12.3	74.25	5.2	89.5
Female	12.5	71.25	5.5	89.7

[1]See Appendix B for a description of this scale.

Stimuli

Predifferentiation

The stimulus material used in the predifferentiation phase of this study consisted of 6 study lists of 32 word-pairs, 3 study lists of 32 single words and 2 test lists, constructed from material by Underwood and Richardson (1956). Three of the study lists, the Equivalence Lists (EQ) contained 32 stimulus words and 8 response words. The 32 stimulus words were selected from the Underwood and Richardson material in such a way that there were 8 different 4 word groups from which eight different concepts could be learned. Four of the word groups with an average dominance level of 54.2 were labelled "easy," while the other four with a dominance level of 12.87 were labelled "difficult." Table 2 contains the word groups, dominance levels, and 8 concepts.

The 8 response words for the 32 stimulus words in the EQ Lists were selected in such a way that the response words would suggest the relevant dimension which could be used in deducing the correct concepts from the 8 four word groups. The same response word was paired with each of the four stimulus words which made up a particular word group. For example, the response word "taste" was paired with Lemon, Pickle, Grapefruit, and Vinegar, and the response word "feel" was paired with the stimulus words Eel, Oyster, Lizard, and Seaweed, etc. (See Appendix A).

The 3 EQ Lists were the same except that the 32 word pairs were arranged in different random orders such that

TABLE 2.--Word groups, concepts and dominance levels.

Word Groups	Concepts	Dominance Levels
Badge Buckle Diamond Aluminum	Shiny	67% (easy)
Eel Oyster Lizard Seaweed	Slimy	48% (easy)
Lemon Pickle Grapefruit Vinegar	Sour	57% (easy)
Sulphur Cigar Onion Pine	Smelly	45% (easy)
Snail Cherry Grape Skull	Round	14% (difficult)
Earthworm Closet Freckle Tack	Small	16% (difficult)
City Rattlesnake Telephone Zoo	Noisy	9.5% (difficult)
Baseball Fang Paste Sugar	White	12% (difficult)

no more than two of the four words belonging to the same word group appeared together.

The other 3 lists of word pairs, the Distinctive Lists (DI) contained the same 32 stimulus words which comprised the EQ Lists. However, the response words which were selected to maximize response competition differed from those in the EQ Lists in that: (1) each stimulus word had a different response word, (2) the response words were related to the stimulus words but not to the relevant dimensions of the concepts to be learned, and (3) none of the response words was the same as any of those in the EQ Lists. Thus, there were 32 different response words for each of the 32 stimulus words. The same 8 concepts which were common to the EQ Lists were also common to the DI Lists.

Each of the 3 DI Lists differed only in the random order in which the word pairs were arranged. The order of arrangement for the DI Lists conformed to the same restriction which governed the EQ Lists.

The 3 single word lists, the Observation Lists (OB), again contained the same stimulus words as the EQ and the DI Lists. There were, however, no response words for any of the stimulus words in these lists. The order of arrangement in the 3 lists was random and followed the same restriction which governed the EQ and the DI Lists.

The 2 test lists contained random arrangements of the 32 stimulus words which were common to the study list. One test list, TL_1, contained the 32 stimulus words and 32 blank spaces in which could be written the appropriate response words. The second test list, TL_2, contained the 32 stimulus words plus 34 additional words which were not included in either of the study lists.

Concept Learning

The stimulus material used in this phase of the study consisted of a 3 x 5 inch cards on which were printed the 8 four word groups.

Procedure

Prior to predifferentiation the 80 Ss were randomly divided into 4 groups of 20, and randomly assigned to one of four treatment conditions, namely: equivalence labeling, distinctive labeling, observation, and no pretraining. Ten males and ten females comprised each of the four groups.

During the predifferentiation phase of the experiment, those Ss assigned to the Equivalence Labeling Group (ELG) were given one of the EQ List and instructed to study the list for 2 minutes (Appendix A). At the end of the 2 minute period the Ss were given test list TL_1 and instructed to write the response words which belonged with each of the stimulus words on the list. If the Ss did not correctly supply the correct response for each of the stimulus words, they were given another of the EQ Lists and permitted to study for another 2 minute period. Again, the Ss were given test list TL_1 and instructed to supply the missing response words. This procedure was continued until the Ss supplied the correct response words for all the stimulus words. All Ss were individually administered the predifferentiation tasks.

Following predifferentiation, each Ss was individually given the concept learning task. The 8 cards containing the 8 four word groups were presented in the following order: (1) one half of the Ss received the "easy" word groups first, and then the "difficult" word groups, (2) the other half of the Ss were given the difficult word groups first and then the easy word groups. At the presentation of each card, the Ss were instructed to read each of the words carefully and to indicate in what way the words were alike. The presentations were further restricted in that all Ss had to supply the correct concept for each of the four word groups in a given category of difficulty or exhaust the allotted trials before they proceeded to the next category. That is, if Ss were given the easy word groups first, they had to supply the correct concepts for each of the four easy word groups or exhaust all trials before they proceeded to the difficult word pairs and vice versa. However, within the 2 categories of difficulty, the presentation of the word pairs was random. One half of the Ss in each group received the easy concepts first, and then the difficult ones, while the other half received the difficult-easy sequence. Subjects were given 15 trials to correctly supply the concepts to each of the 8 four word pairs.

The procedure for Ss assigned to the Distinctive Labeling Group (DI) was the same as that for the Equivalence Labeling Group. The procedure for the Observation Group was also the same as that for the Equivalence and Distinctive Labeling Groups except that the Observation Group was given the OB Lists to study and was required to circle those words on TL_2 which were on the OB Lists.

The No-Pretraining Group received no predifferentiation, but was given the concept learning task in the same way the other 3 groups received it.

Statistical Design

The statistical design used in this study was a 4 x 2 x 3 factorial repeated measures design (Winer, 1962). Two levels of concept complexity, "easy and difficult," 3 blocks of 5 trials, and 3 levels of predifferentiation, "equivalence labeling, distinctive labeling, and observation" plus a control group constituted the experimental arrangements.

CHAPTER IV

RESULTS

Subjects' Characteristics

The validity of the results of this study is of necessity predicated on a demonstration of the equalization of the characteristics of Ss within the treatment groups. These preliminary data are presented to accomplish this objective. Table 3 summarizes Ss' chronological age (CA) by sex and treatment group. It is apparent from Table 3 that Ss did not differ in CA by sex or treatment group.

TABLE 3.--Mean chronological age of Ss by sex and treatment group.

Treatment Group	Male		Female	
	Mean	SD	Mean	SD
Equivalence Group	12.20	1.60	12.10	1.30
Observation Group	12.40	1.48	12.30	1.45
No Pretraining Group	12.30	1.44	12.20	1.45
Distinctive Group	12.30	1.45	12.50	1.50

Table 4 summarizes the socio-economic status (SES) of Ss by sex and treatment group. Again the results suggest that Ss did not differ in SES by sex or treatment group.

TABLE 4.--Mean SES by sex and treatment group.

Treatment Group	Male		Female	
	Mean	SD	Mean	SD
Equivalence Group	80.10	10.41	79.20	12.40
Observation Group	78.20	11.31	78.40	11.56
No Pretraining Group	79.00	10.50	78.50	10.80
Distinctive Group	78.30	11.61	78.90	10.15

The mean IQ of Ss in the four groups ranged from 89.1 for the No Pretraining Group to 90.1 for the Equivalence Group. Comparable mean IQ's for the Observation and Distinctive Groups were 89.7 and 90.0. Moreover, the mean reading grade placement for the four groups ranged from 4.9 for the No Pretraining Group to 5.4 for the Equivalence Group. Mean reading grade placements for the Distinctive and Observation Groups were 5.3 and 5.1.

Pretraining

Initial analysis of the pretraining data indicated a significant relationship between the number of trials to criterion on pretraining tasks and the number of concepts learned ($r = .78$, $df = 58$, $p < .01$). The mean number of trials to criterion for the Equivalence (EQ), Observation (OB), and the Distinctive (DI) Groups was 6.60, 5.05, and 4.20 respectively. The standard deviations for the three groups were 2.43, 2.04, and 1.80. Further analyses of the mean difference in trials to criterion revealed that the Equivalence Group required significantly more trials to reach criterion than the Distinctive Group ($t = 3.52$, $df = 38$, $p < .01$). Moreover, this analysis revealed that the Equivalence group also required significantly more trials to reach criterion than the Observation Group ($t = 2.18$, $df = 38$, $p < .01$). There was, however, no significant difference between the Distinctive and Observation Groups.

Concept Learning

One of the basic hypotheses examined in this study was that verbal concept learning among the disadvantage would vary as a function of stimulus pretraining. An analysis of variance on the mean number of concepts learned was performed to examine this and other hypotheses. Table 5 summarizes the results of this analysis.

The significant A main effect suggests that the mean number of concepts learned varied significantly as a function of pretraining ($F = 31.93$, $df = 3/76$, $p < .01$). Table 6 contains the means and standard deviations for the pretraining groups.

TABLE 5.--Summary of the analysis of variance on the mean number of concepts learned.

Source	df	MS	F
Between Subjects			
A (Pretraining)	3	136.69	31.93**
Subjects within groups	76	4.28	
Within Subjects			
B (Concept Complexity)	1	50.10	39.44**
AB	3	8.90	7.01**
Bx Subjects within groups	76	1.27	
C (Trials)	2	12.25	4.26**
AC	6	.58	.20
Cx Subjects within groups	152	2.87	
BC	2	.19	.29
ABC	6	10.58	16.27**
BCx Subjects within groups	152	.65	

**p < .01

TABLE 6.--Means and standard deviations of number of concepts learned by pretraining group.

Pretraining Group	Mean	SD
Equivalence	8.00	0.00
Observation	4.75	2.44
No Pretraining	3.50	1.56
Distinctive	3.40	2.13

In view of the significant A main effect, multiple comparisons of the mean number of concepts learned by pretraining condition were performed by means of the Newman-Keuls procedure. These comparisons permitted the examination of the following hypotheses:

(1) Equivalence labeling would better facilitate the acquisition of concepts than distinctive labeling.

(2) Equivalence labeling would better facilitate the acquisition of concepts than observation.

(3) Equivalence labeling would better facilitate the acquisition of concepts than no pretraining.

(4) Observation would better facilitate the acquisition of concepts than distinctive labeling.

(5) Observation would better facilitate the acquisition of concepts than no pretraining.

(6) No pretraining would better facilitate the acquisition of concepts than distinctive labeling.

Table 7 summarizes the comparison of group means.

TABLE 7.--Multiple comparison of group means by Newman-Keuls procedure.

Pretraining Group	EQ	OB	NPT	DI
		Ordered Mean Differences		
Equivalence (EQ)		3.25**	4.50**	4.60**
Observation (OB)			1.25	1.35
No Pretraining (NPT)				0.10

**$p < .05$

An inspection of this table reveals that significant differences were found in only the comparisons involving the Equivalence Group. In accord with predictions, the Equivalence Group was superior to the Observation, Distinctive, and No Pretraining groups. Contrary to predictions, no significant differences were observed between the Observation, No Pretraining, and Distinctive Groups. However, the results obtained for these three groups were in the predicted direction.

A second basic hypothesis examined in this study was that verbal concept learning would vary as a function of concept complexity. The significant B main effect suggests that concept learning varied significantly as a function of concept complexity ($F = 39.44$, $df = 1/76$, $p < .01$). Subsequent analysis of the mean difference between the number of easy and difficult concepts learned revealed that significantly more to the easy concepts were learned than difficult ones ($t = 5.11$, $df = 79$, $p < .001$). The mean number of easy and difficult concepts learned was 2.80 and 2.11 respectively.

Moreover, the overall analysis of variance in accord with predictions revealed a significant pretraining x concept complexity interaction ($F = 7.01$, $df = 3.76$, $p < .01$). Figure 1 shows the geometric representation of this interaction. Inspection of the interaction profile suggests that the

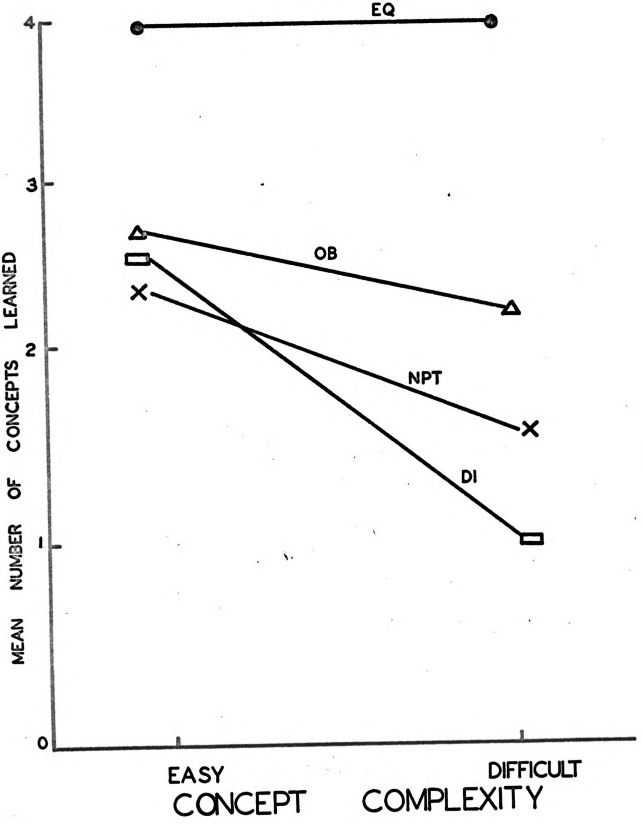

FIGURE I. PRETRAINING X CONCEPT COMPLEXITY INTERACTION slope of the acquisition line for the Equivalence Group is different from the slopes of the other three groups. An additional source of the A x B interaction would appear to be related to the performance of the Distinctive and No Pretraining Groups. The profile suggests that the Distinctive Group learned more of the easy concepts but a lesser number of difficult concepts than the No Pretraining Group.

Additional analyses were conducted to further determine the source of the A x B interaction. Tests of simple effects for pretraining were conducted in accordance with procedures suggested by Winer (1962). Table 8 summarizes this analysis.

TABLE 8.--Analysis of variance on simple effects for pretraining.

Source	df	MS	F
A at B_1	3	99.76	47.96*
A at B_2	3	318.33	153.04*
Within Cell	456	2.08	

*$p < .01$

The results of this analysis suggest that the number of easy concepts learned varied significantly as a function of pretraining ($F = 47.96$, $df = 3/456$, $p < .01$). The mean number of easy concepts ranged from 4.00 for the Equivalence Group to 2.10 for the No Pretraining Group. The mean number of easy concepts learned by the Observation and Distinctive Groups was 2.70 and 2.40 respectively. This analysis further showed that the number of difficult concepts learned also varied as a function of pretraining ($F = 153.04$, $df = 3/456$, $p < .01$). The mean number of difficult concepts learned ranged from 4.00 for the Equivalence Group to 1.00 for the Distinctive Group. Comparable means for the Observation and No Pretraining Groups were 2.05 and 1.40 respectively.

In view of the significant simple effects for pretraining at both levels of concept complexity, multiple comparisons of the mean number of easy and difficult concepts learned at each level of pretraining were performed by means of the Newman-Keuls procedure. Tables 9 and 10 summarizes the results of this analysis.

TABLE 9.--Multiple comparison of mean number of easy concepts learned at each level of pretraining.

Groups	EQ	OB	DI	NPT
	Ordered Mean Differences			
Equivalence Group (EQ)		1.30*	1.60*	1.85*
Observation Group (OB)			0.30	0.65
Distinctive Group (DI)				0.25

*p < .05

Inspection of Table 9 reveals that the Equivalence Group learned significantly more of the easy concepts than the Observation, Distinctive, and No Pretraining (NPT) Groups. No significant differences existed among the other three groups. The results obtained, however, were in the predicted direction.

Table 10 contains a similar analysis of the mean number of difficult concepts learned at each level of pretraining.

TABLE 10.--Multiple comparisons of mean number of difficult concepts learned at each level of pretraining.

Group	EQ	OB	NPT	DI
	Ordered Mean Differences			
Equivalence Group (EQ)		1.95*	2.60*	3.00*
Observation Group (OB)			0.65	1.05
No Pretraining Group (NPT)				0.40

*$p < .05$

Again, an inspection of this table reveals that the EQ Group learned significantly more of the difficult concepts than the other three groups. There was, however, no significant differences between the OB, NPT, and DI Groups.

Figures 2 and 3 show the mean number of easy and difficult concepts learned as a function of pretraining.

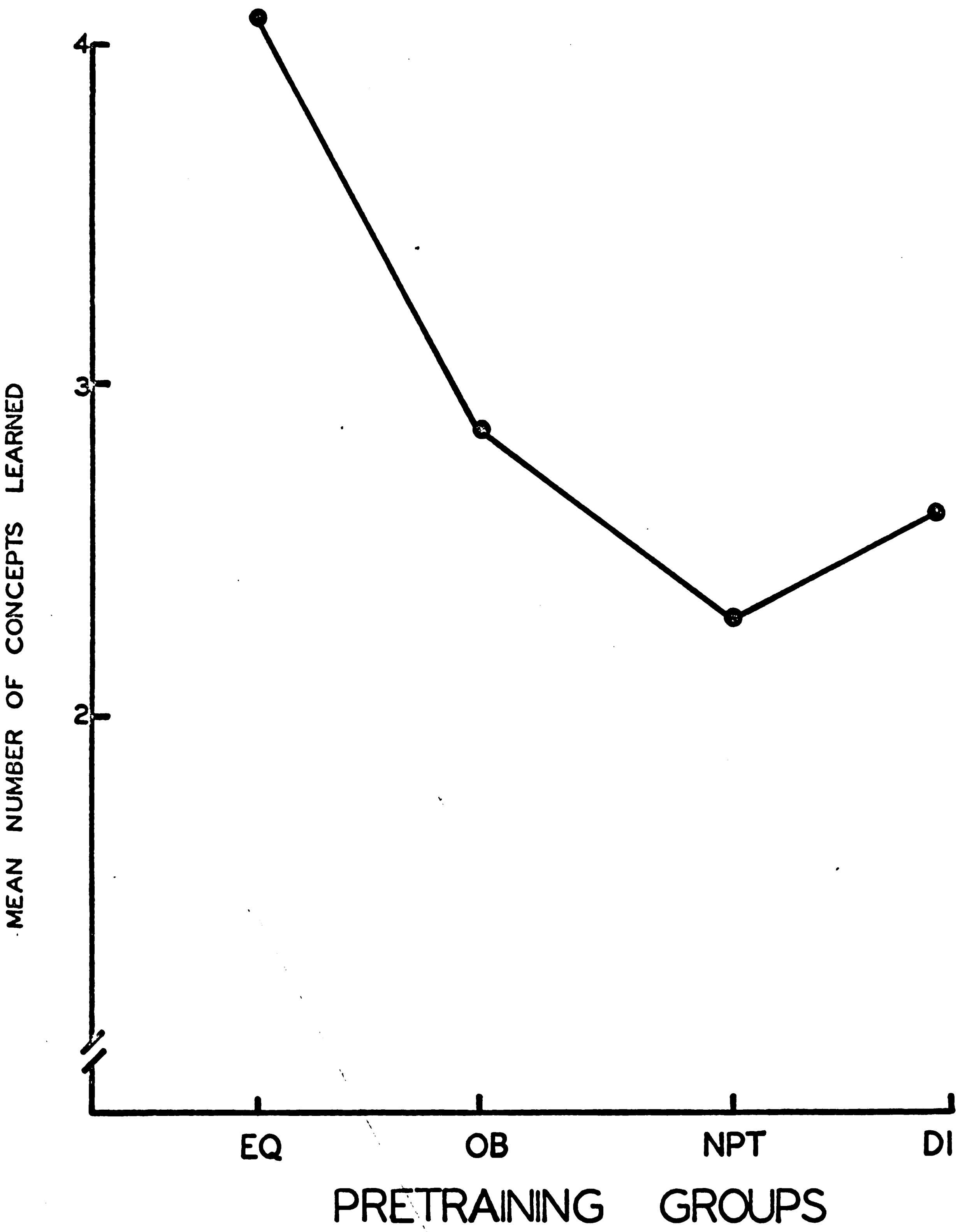

FIGURE 2. NUMBER OF EASY CONCEPTS LEARNED BY PRETRAINING GROUPS

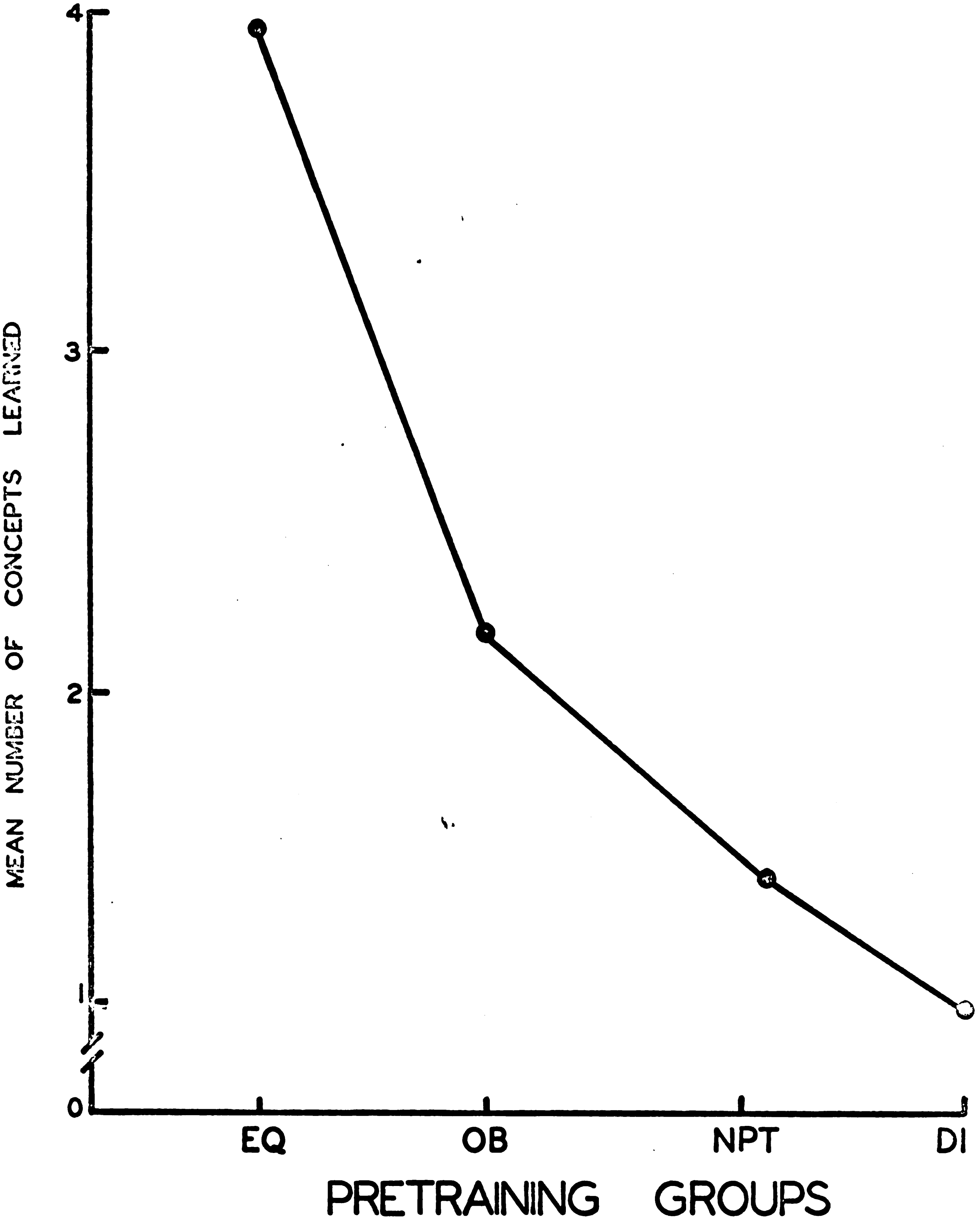

FIGURE 3. NUMBER OF DIFFICULT CONCEPTS LEARNED BY PRETRAINING GROUPS

A comparison of these figures suggests that the acquisition curves are different.

Further analysis involved an examination of simple effects for concept complexity at all levels of predifferentiation. Since only two levels of concept complexity were involved, this analysis facilitated the determination of whether differences existed between the mean number of easy and difficult concepts at each level of pretraining. Table 11 summarizes the results of this analysis.

TABLE 11.--Analysis of variance on simple effects for concept complexity.

Source	df	MS	F
B at A_1	1	0.00	
B at A_2	1	4.20	3.07***
B at A_3	1	4.90	3.85**
B at A_4	1	19.20	15.43*
B x <u>Ss</u> with Groups	76	1.27	

*$p < .01$ **$p < .05$ ***$P < .10$

This analysis revealed a number of significant results. Significantly, more of the easy concepts were learned than difficult concepts under the Observation (A_2), No Pretraining (A_3), and Distinctive (A_4) conditions. There was, however, no significant difference in the number of easy and difficult concepts learned under the Equivalence (A_1) condition. Table

12 shows the mean number of easy and difficult concepts learned at each level of pretraining.

TABLE 12.--Means and standard deviation of number of easy and difficult concepts learned by pretraining groups.

Pretraining Group	Concepts			
	Easy		Difficult	
	Mean	SD	Mean	SD
Equivalence	4.00	0.00	4.00	0.00
Observation	2.70	0.92	2.05	0.40
No Pretraining	2.10	0.82	1.40	0.28
Distinctive	2.40	0.50	1.00	0.60

Moreover, the overall analysis revealed a significant main effect due to trials ($F = 4.26$, $df = 2/152$, $p < .01$). These results suggest that the mean number of concepts learned varied significantly as a function of trials. Table 13 contains the mean number of concepts learned by blocks of trials and pretraining group.

Further analysis of the mean number of concepts learned as a function of trials was conducted by means of the Newman-Keuls procedure. Table 14 contains the results of this analysis.

TABLE 13.--Mean and standard deviations of number of concepts learned by pretraining groups and trials.

Pretraining Group	Blocks of Five Trials 1		2		3	
	Mean	SD	Mean	SD	Mean	SD
Equivalence	7.34	0.47	8.00	0.00	8.00	0.00
Observation	3.46	2.17	4.75	2.44	4.75	2.44
No Pretraining	3.10	1.48	3.50	1.56	3.50	1.56
Distinctive	2.22	1.49	3.40	2.13	3.40	2.13

TABLE 14.--Multiple comparison of mean number of concepts learned as a function of blocks of trials.

Blocks of Trials	1 Ordered	2 Mean	3 Difference
1		.99*	1.01*
2			.02

*$p < .05$

The results of this analysis suggest that significantly more concepts were learned during the second and third blocks of trials than during the first block. No significant difference, however, occurred between the number of concepts learned on the second and third blocks of trials. Figure 4 shows the mean number of concepts learned by blocks of trials and pretraining groups.

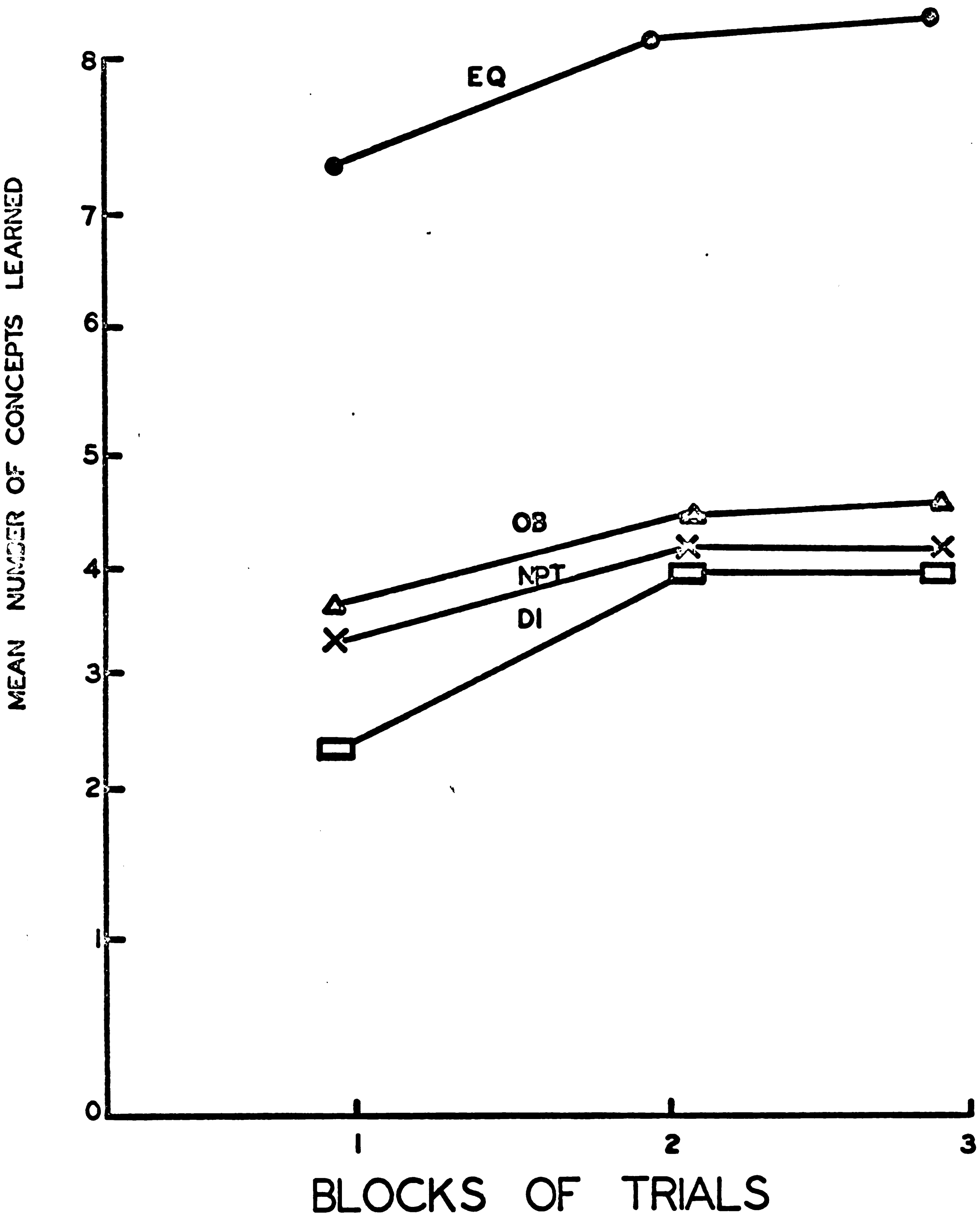

FIGURE 4. NUMBER OF CONCEPTS LEARNED BY PRETRAINING GROUPS AND BLOCKS OF TRIALS

The overall analysis of variance permitted an examination of two additional two factor interactions (Pretraining x trials; Concept complexity x trials) and one 3 factor interaction (pretraining x concept complexity x trials). The results of this analysis revealed that neither the pretraining x concept complexity nor the concept complexity x trials interaction was significant. These results suggest that the relationship between trials and pretraining and trials and concept complexity is additive rather than multiplicative.

The analysis, however, revealed a significant pretraining x concept complexity x trials interaction ($F = 16.27$, $df = 6/152$, $p < .01$). Figures 5 and 6 show graphically this interaction. Inspection of Figure 5 suggests that one source of this triple interaction is related to the fact that the Distinctive Group learned a smaller number of easy concepts on the first block of trials than the No Pretraining Group, but a greater number on the second and third blocks of trials. Another source of the interaction is one which is not so apparent from an inspection of Figures 5 and 6 is the fact that Ss in the Equivalence Group learned more difficult than easy concepts on the first block of trials. Tables 15 and 16 contain the means and standard deviations of number of concepts learned by level of concept complexity, pretraining groups, and blocks of trials.

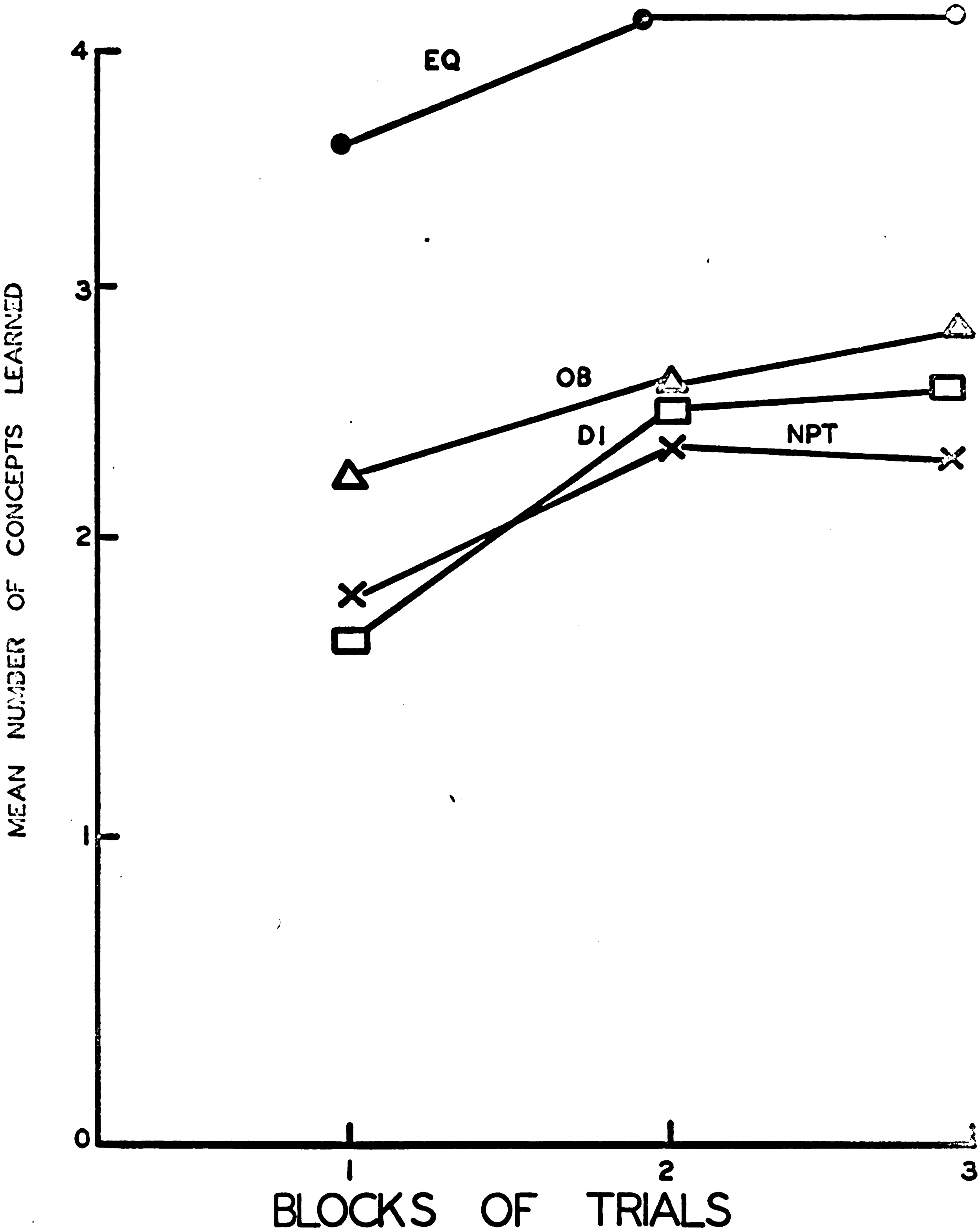

FIGURE 5. NUMBER OF EASY CONCEPTS LEARNED BY PRE-TRAINING GROUPS AND BLOCKS OF TRIALS

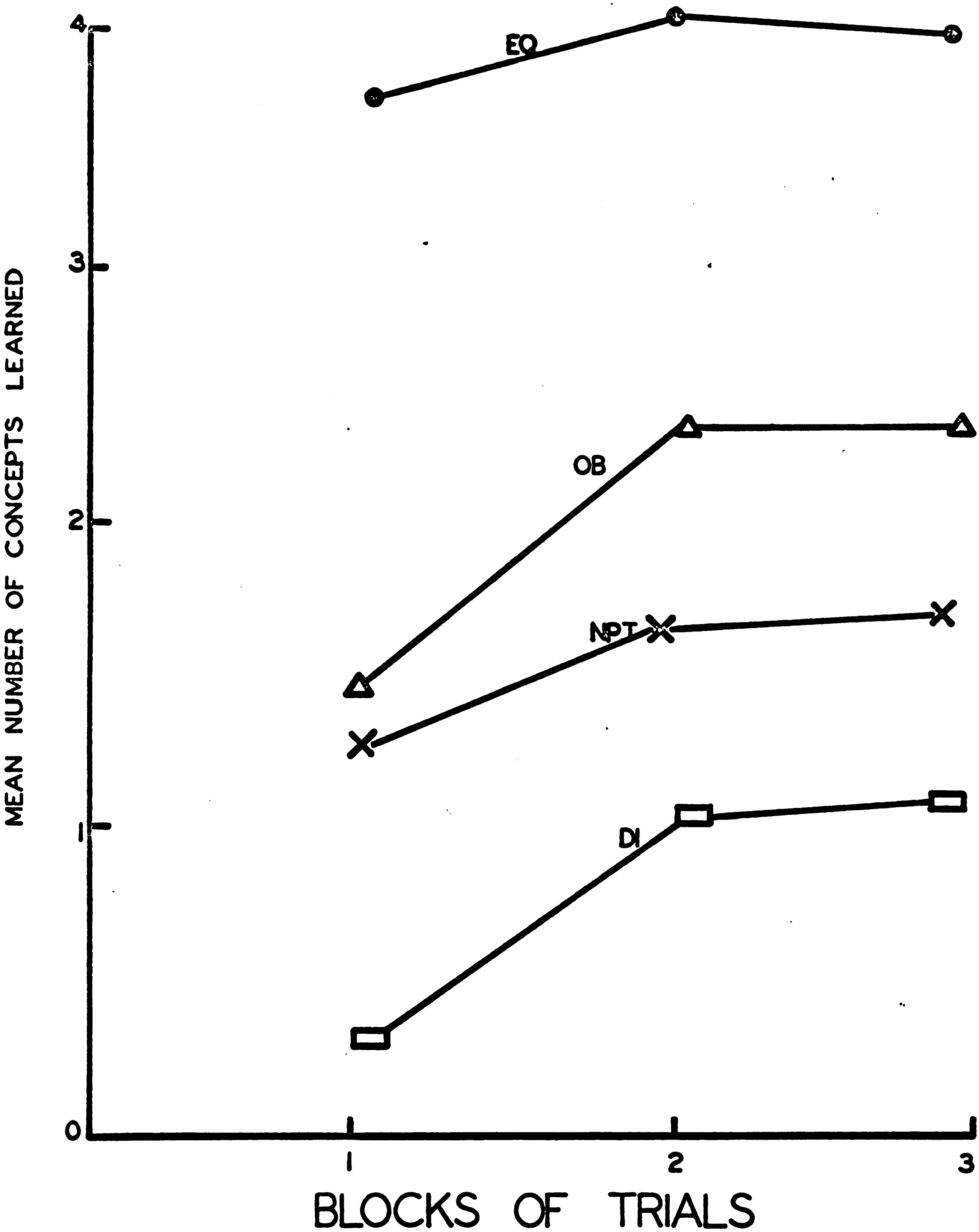

FIGURE 6 NUMBER OF DIFFICULT CONCEPTS LEARNED BY PRETRAINING GROUPS AND BLOCKS OF TRIALS

TABLE 15.--Means and standard deviations of number of easy concepts learned by pretraining groups and blocks of trials.

Pretraining Groups	Blocks of Trials 1		2		3	
	Mean	SD	Mean	DS	Mean	SD
Equivalence	3.64	0.51	4.00	0.00	4.00	0.00
Observation	2.10	0.50	2.54	0.81	2.70	0.92
No Pretraining	1.81	0.70	2.10	0.82	2.10	0.82
Distinctive	1.80	0.40	2.40	0.50	2.40	0.50

TABLE 16.--Means and standard deviations of number of difficult concepts learned by pretraining groups and blocks of trials.

Pretraining Groups	Blocks of Trials 1		2		3	
	Mean	SD	Mean	SD	Mean	SD
Equivalence	3.70	0.52	4.00	0.00	4.00	0.00
Observation	1.34	0.30	2.05	0.35	2.05	0.35
No Pretraining	1.29	0.25	1.40	0.28	1.40	0.28
Distinctive	0.42	0.16	1.00	0.60	1.00	0.60

CHAPTER V

DISCUSSION

The Relationship between the Findings and Theory

Although the results of this study appear to be obscured to a degree by a possible ceiling effect, they suggest that the pretraining conditions used can be ordered in terms of their effectiveness in producing positive transfer. This finding is in agreement with theoretical assertions by Dollard and Miller (1950), Gibson and Gibson (1955), and Goss (1955). In terms of the present study, equivalence pretraining facilitated the greatest amount of transfer while distinctive training produced the least. While significant differences did not occur in comparisons involving the observation, distinctive, and no pretraining conditions, the trends observed were strong and congruent with theoretical predictions. These trends indicate that observation pretraining was superior to distinctive and no pretraining while no pretraining was superior to distinctive training.

The difference in the effectiveness with which the pretraining conditions facilitated transfer would appear to be related to the degree to which the pretraining conditions provided relevant cues or promoted accurate cue utilization. This assertion would probably be concurred in by Gibson and Gibson (1955), Goss (1955), and Dollard and Miller (1950). The process, however, by which pretraining produces accurate cues or cue utilization has been debated by these theorists. Gibson and Gibson (1955) suggests that pretraining does not provide additional cues, but directs the organism to the relevant aspects of the stimulus complex which are essential for acquiring a given learning task. Thus, the chief function of pretraining according to this position is to facilitate accurate cue or stimulus utilization.

Dollard and Miller, and Goss, on the other hand, suggest that the pretraining functions chiefly in producing relevant cues for use in subsequent learning tasks. Stimulus pretraining, then is an enriching cue producing activity.

Unfortunately, the results of this study do not permit a substantiation of either of these positions. The resolution of this theoretical issue must await studies or developments which will permit a more adequate quantitative description of the stimuli to be predifferentiated. Such studies would provide detailed knowledge of the functional relationship between the relevant stimulus attributes, and the processes which account for transfer. However, the lack of this detail knowledge should not preclude the use of stimulus predifferentiation as a method for facilitating positive transfer.

The significant pretraining x concept complexity interaction observed in this study is consistent with the theoretical prediction of Goss (1955). The interaction observed would appear to be related to the fact that the distinctive pretraining group learned more of the easy concepts than the no pretraining group, but a lesser number of difficult concepts. Although the differences in the number of concepts learned by the Distinctive and No Pretraining Groups at each level of concept complexity were not significant, the trend is suggestive. It appears that while distinctive training does not either facilitate or inhibit the acquisition of easy concepts when compared with No Pretraining, it appears to inhibit the acquisition of difficult concepts. Although an explanation for this finding is obscure, the implication is that distinctive pretraining may under certain conditions have no influence on the acquisition of verbal concept learning tasks while under other conditions it may have an inhibitory effect.

Relationship between the Results and Previous Findings

The findings relating to the effect of pretraining on the concept learning generally appear to be inconsistent with previous findings. Previous research (Robinson, 1955; Ellis and Muller, 1964; Ellis, Bessemer, Devine, and Trafton, 1962) has generally shown that distinctive labeling or pretraining is superior to observation, equivalence, and no pretraining in facilitating positive transfer. Moreover, this same research has shown that while observation, and equivalence pretraining provides more transfer than no pretraining, there is generally no difference in the amount of transfer produced when observation is compared with equivalence training.

In terms of the present study, equivalence pretraining facilitated the greatest amount of transfer followed by observation, no pretraining and distinctive labeling respectively. Moreover, the trends observed suggest that observation pretraining was superior to both no pretraining and distinctive labeling, while no pretraining was superior to distinctive labeling in facilitating transfer.

One possible explanation for these findings is that the effectiveness of various types of pretraining is determined to a degree by the nature of the subsequent learning tasks. It should be recalled that the studies conducted by Robinson (1955), Ellis and Muller (1964), and Ellis, Bessemer, Devine, and Trafton (1962) examined the effect of pretraining on the acquisition of discrimination tasks while in the present study a verbal concept learning task was employed. The implication here is that differences in effectiveness of pretraining conditions in this and the other studies is related to the fact that discrimination and verbal concept learning are different tasks.

That discrimination and concept learning are different tasks has been argued persuasively by Gagné (1965). According to Gagné discrimination learning is essentially a matter of establishing a number of different (response) chains. That is, the organism develops the capacity to make different responses to different members of a particular stimulus collection. Concept learning, on the other hand, involves the development of the capacity to respond in a single way to single collection of stimulus objects.

The implication of these two definitions is that for discrimination learning the primary process involved is discrimination, while for concept learning the chief process is generalization. Given that this implication is valid, it becomes possible to account for the present and previous findings.

According to Gagné (1965) one of the optimal conditions for facilitating discrimination learning is to lessen the similarity between the stimuli to be discriminated. This may be accomplished (1) by choosing stimuli which have disparate attributes, and (2) by providing some kind of cue, or activity which will maximize the discrimination of the stimuli (e.g., pretraining). In the previously cited studies some Ss were required to learn a distinctive label for each stimuli presented during pretraining, while others learned the same label for two or more of the stimuli (equivalence labeling). According to Gagné's assertion, those Ss receiving distinctive labeling would be superior on a subsequent discrimination task to those receiving equivalence labeling. The results from the previously cited studies support this prediction. The superiority of Ss receiving distinctive labeling would appear to be related to the fact that distinctive labeling maximized stimuli discrimination, while equivalence labeling inhibits it. The effect of equivalence labeling, it can be said, is to make disparate stimuli functionally or perceptual equivalent.

If the effect of equivalence labeling is to make stimuli equivalent, (i.e., to facilitate generalization among stimuli), then it should facilitate concept learning. On the other hand, if distinctive labeling increases the disparity between stimuli (i.e., inhibits generalization) then it should inhibit concept learning. The results of the present study support this assertion. Equivalence labeling was superior to all types of pretraining in facilitating concept learning.

Previous research has shown that observation or directed attention is second only to distinctive labeling in facilitating transfer in discrimination learning tasks. The results of the present study indicate that observation was also the second most effective pretraining method. Although the general effectiveness of observation pretraining in promoting transfer in both discrimination and concept learning tasks is the same, two different explanation appear possible.

The effectiveness of observation or direct attention pretraining in facilitating transfer in discrimination learning appears related to the fact that this type of training directs Ss' attention to stimulus attributes which can be used in making correct discrimination. However, the effectiveness of observation pretraining as used in this study might be related to the fact it afforded Ss an opportunity to engage in a kind of facilitative clustering or organizing similar to the kind described by Bousfield and Cohen (1953). Bousfield and Cohen have found that when Ss are required to recall words which are conceptually or semantically related, they tend to place those words which are related in the same cluster.

It should be recalled that in the present study, Ss in the observation condition were: (1) required to study randomly arranged lists of the stimulus words, and (2) to select the stimulus word which they had learned from a longer list of words. Since the 32 stimulus words which comprised the study list were related, it is possible that Ss in this condition learned through the process of clustering. Given that Ss in this condition engaged in clustering during pretraining, all that the Ss were required to do during the concept learning phase was to verbalize the basis on which the words had been clustered. That is, since concept formation occurred during pretraining, all that was necessary in the second phase was to verbalize the concept. The fact that the requirements of the conceptual task were considerably reduced increased concept learning performance.

First - Order Interactions

The significant pretraining x concept complexity is consistent with both the theoretical predictions of Goss (1955) and previous findings reported by Ellis and Muller (1964). The source of the interaction in the Ellis and Muller study obtained in the finding that distinctive labeling produced better recognition of complex shapes, but poorer recognition of simple shapes than observation. The interaction observed in the present study is related to the fact that Ss in the distinctive pretraining condition learned more of the easy concepts, but a lesser number of difficult concepts than Ss in the no pretraining group. Both the previous findings and the present results suggest that the relationship between pretraining and complexity is multiplicative irrespective of whether the stimuli are verbal or non-verbal.

The failure to obtain significant interactions between pretraining and trials, or between concept complexity and trials would suggest that these interactions need not be considered in future studies involving these variables. That is, these results suggest that sources of variances due to these interactions may be pooled to yield more powerful tests on main effects and other interactions.

The Pretraining x Concept Complexity x Trials Interaction

Previous researchers have not structured experiments which permit an examination of the relationship between pretraining, complexity of stimuli, and trials. The lack of previous findings hampers any attempt to interpret the meaning of the significant triple interaction observed in this study. Whether this is a meaningful finding or whether it is a statistical artifact must be determined by further research.

Significant Main Effects due to Concept Complexity and Trials

The only productive point which emerges from the significant main effect due to concept complexity is that it verifies the presently used operational definition of complexity. This finding suggests that the dominance level is a useful and valid method for determining the difficult level of verbal concepts.

The significant main effect due to trials confirms previous findings, and simply suggests that concept learning improved as a function of practice.

Significance of The Findings as They Relate to The Disadvantaged

The overall results of this study indicate that those engaged in teaching the disadvantaged would be well advised to develop syllabi, study guides, or other kinds of preliminary activities which facilitate transfer of training. The design and the use of these preliminary devices should provide these exceptional Ss with the necessary cognitive pegs or mediating devices for acquiring and effectively using concepts.

Moreover, such activities could indirectly influence the conative behavior of these Ss. Given that such activities or devices provide success experiences for these Ss, motivation and the willingness to engage in learning tasks are likely to be increased.

Implications for Further Research

That pretraining is an effective procedure for facilitating concept learning among the disadvantaged has been convincingly demonstrated by the results of this study. However, several interesting and valuable research questions remain unanswered. One researchable question which needs to be answered is: To what degree does the kind of pretraining used in this study facilitate the acquisition of other concepts? Detailed research studies designed to attack this question could in addition to answering the basic question provide information relating to the nature of the transfer process and the variables which influence it. Such information would be invaluable in developing educational technology and theory for disadvantaged as well as advantaged pupils.

A second researchable question and one which is related to the first is: To what degree does pretraining influence retention among disadvantaged Ss? Research designed to answer this question would of necessity deal with the influence of pretraining on both short and long term retention. Given that adequate information regarding the influence of pretraining on retention is acquired, and given that previously mentioned research question is answered, it would be possible to generate a model which would relate in detail the relationship between concept learning, retention, and pretraining. The development of such a model would have both theoretical and practical value.

Another research question which should be pursued is: Can the kinds of pretraining used in this study be effectively used with younger disadvantaged Ss? If further research demonstrates that pretraining can be used effectively with younger Ss, a valuable psychological and educational goal can be reached. The effect of being able to use pretraining with younger Ss would be to reduce considerably not only the number of disadvantaged Ss in school populations, but also the number of learning difficulties experienced by this exceptional group.

A fourth research question which should be examined is: What influence would the kinds of pretraining employed in this study have on the acquisition of concepts of medium difficulty? If this research question is answered, it would become possible to specify and predict the acquisition of all verbal concepts across the complexity dimension. This information would conceivably then permit the most effective kind of pretraining to be selected for teaching verbal concepts of varying levels of difficult.

Limitations of the Present Study

One of the possible limitations of the present study would appear to be related to the fact that an insufficient number of concepts was used. The effect of the limited number of concepts used appears to have manifested itself in reducing the variance among the groups, thus obscuring or preventing the discovery of more significant differences. However, in spite of this apparent shortcoming, the findings have meaningful implications for those who instruct the disadvantaged.

CHAPTER VI

SUMMARY AND CONCLUSION

The present study examined the effect of relevant stimulus pretraining on the acquisition of easy and difficult verbal concepts by disadvantaged Ss. Eighty Negro 7th graders matched on IQ, CA, socio-economic status, and reading grade placement were randomly assigned to one of four pretraining conditions namely: equivalence labeling, distinctive labeling, observation, and no pretraining.

Following pretraining, Ss were individually given a concept learning task in which they were required to indicate what common concepts a group of words referred to.

The results obtained indicated:

(1) that concept learning varied significantly as a function of pretraining.

A. Equivalence labeling was superior to all other types of pretraining in facilitating transfer.

(2) that concept learning varied signigicantly as a function of concept complexity.

A. More of the easy concepts were learned than difficult concepts.

(3) that a multiplicative relationship exists between pretraining and concept complexity.

(4) that a multiplicative relationship exists between pretraining, concept complexity and trials.

(5) that an additive relationship exists between pretraining and trials, and between concept complexity and trials.

The main conclusion which derives from these findings is that verbal concept among the disadvantaged can be greatly facilitated by stimulus pretraining. Additional research was suggested to clarify the relationship between pretraining and other learning variables.

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APPENDIX A

STIMULUS MATERIALS USED IN THIS STUDY

LEARNING TASK

INSTRUCTIONS
(For All Groups)

I am going to show you some cards with four words on them. Read each word carefully and tell me in what way the words are alike.

For example: If I ask in what way are Basketball, Tennis, Track, and Football alike, what would you say?

If S does not get this example correct: Tell him that all of them are sports.

Now in what way are Thomas Jefferson, Abe Lincoln, George Washington, and Richard Nixon alike?

If S says they are all men, say yes, that is right, but can you think of any other way in which they are alike.

If S cannot answer: Tell him they are all Presidents of the United States.

Ask: Are there any questions?

If there are no questions: Show first card and ask:

In what way are:_________________, ________________, ______,

and ________________________________alike?

DIFFICULT CONCEPTS

DISTINCTIVE LABELS

SNAIL	SLOW
CHERRY	RED
GRAPE	PURPLE
SKULL	BONY
EARTHWORM	CRAWLY
CLOSET	DARK
FRECKLE	FACED
TACK	SHARP
CITY	STREET
RATTLESNAKE	POISON
TELEPHONE	CALL
ZOO	KEEPER
BASEBALL	HARD
FANG	LONG
PASTE	STICKY
SUGAR	SWEET

EQUIVALENCE LABELS

SNAIL, CHERRY, GRAPE, SKULL	SHAPE
EARTHWORM, CLOSET, FRECKLE, TACK	SIZE
CITY, RATTLESNAKE, TELEPHONE, ZOO	SOUND
BASEBALL, FANG, PASTE, SUGAR	COLOR

EASY CONCEPTS

DISTINCTIVE LABELS

BADGE	PATROL
BUCKLE	BELT
DIAMOND	RING
ALUMINUM	LIGHT
EEL	ELECTRIC
OYSTER	STEW
LIZARD	SCALY
SEAWEED	STRINGY
SULPHUR	YELLOW
CIGAR	ASHES
ONION	PEELS
PINE	TAR
LEMON	FRUIT
PICKLE	GREEN
GRAPEFRUIT	JUICE
VINEGAR	CARMEL

EQUIVALENCE LABELS

BADGE	
BUCKLE	APPEARANCE
DIAMOND	
ALUMINUM	
EEL	
OYSTER	FEEL
LIZARD	
SEAWEED	
SULPHUR	
CIGAR	FUMES
ONION	
PINE	
LEMON	
PICKLE	TASTE
GRAPEFRUIT	
VINEGAR	

INSTRUCTIONS
EQUIVALENCE AND DISTINCTIVE GROUPS
PRETRAINING

You will be asked to learn certain word pairs from a list I will give you. After you have studied the list you will be given a list which contains one word from each of the word pairs you have learned. You will then be asked to write the words which go with each of the words on this list.

Ask: Are there any questions?

If *S* does not understand, demonstrate.

STUDY LIST I

EQUIVALENCE GROUP

oyster - feel
seaweed - feel
freckle - size
cigar - fumes
paste - color
eel - feel
pine - fumes
aluminum - appearance
sulphur - fumes
cherry - shape
rattlesnake - sound
city - sound
lizard - feel
vinegar - taste
buckle - appearance
badge - appearance

baseball - color
snail - shape
skull - shape
closet - size
lemon - taste
diamond - appearance
grape - shape
earthworm - size
fang - color
sugar - color
grapefruit - taste
tack - size
pickle - taste
onion - fumes
zoo - sound
telephone - sound

STUDY LIST II

EQUIVALENCE GROUP

fang - color
pine - fumes
oyster - feel
lemon - taste
grape - shape
freckle - size
eel - feel
pickle - taste
tack - size
buckle - appearance
aluminum - appearance
lizard - feel
snail - shape
seaweed - feel
cherry - shape

sulphur - fumes
earthworm - size
rattlesnake - sound
cigar - fumes
telephone - sound
diamond - appearance
city - sound
closet - size
sugar - color
badge - appearance
baseball - color
zoo - sound
onion - fumes
grapefruit - taste
vinegar - taste
paste - color

STUDY LIST III

EQUIVALENCE GROUP

vinegar - taste
onion - fumes
zoo - sound
grapefruit - taste
grape - shape
taste - color
freckle - size
closet - size
tack - size
badge - appearance
cigar - fumes
seaweed - feel
buckle - appearance
eel - feel
baseball - color
pickle - taste
aluminum - appearance
lizard - feel
pine - fumes
oyster - feel
lemon - taste
fang - color
sulphur - fumes
cherry - shape
rattlesnake - sound
skull - shape
sugar - color
telephone - sound
snail - shape
earthworm - size
city - sound
diamond - appearance

STUDY LIST I

OBSERVATION GROUP

grape	tack
lizard	onion
baseball	oyster
rattlesnake	buckle
pickle	sulphur
aluminum	snail
sugar	pine
skull	city
telephone	freckle
earthworm	paste
vinegar	grapefruit
eel	cigar
zoo	diamond
fang	cherry
closet	badge
lemon	seaweed

STUDY LIST II

OBSERVATION GROUP

sugar	telephone
skull	freckle
aluminum	grapefruit
badge	cigar
rattlesnake	snail
pickle	diamond
sulphur	pine
zoo	buckle
seaweed	fang
eel	grape
lizard	onion
baseball	tack
closet	cherry
city	vinegar
earthworm	lemon
oyster	paste

STUDY LIST III

OBSERVATION GROUP

grape
telephone
onion
cherry
freckle
diamond
buckle
lemon
snail
earthworm
baseball
cigar
lizard
fang
badge
eel
city
pickle
aluminum
zoo
oyster
sulphur
seaweed
skull
vinegar
sugar
grapefruit
paste
closet
tack
rattlesnake
pine

STUDY LIST I

DISTINCTIVE LABELING GROUP

eel - electric

oyster - stew

sulphur - yellow

paste - sticky

lizard - scaly

snail - slow

closet - dark

lemon - fruit

badge - patrol

cherry - red

baseball - hard

seaweed - stringy

cigar - ashes

pickle - green

diamond - ring

pine - tar

rattlesnake - poison

city - street

grapefruit - yellow

zoo - keeper

tack - sharp

fang - snake

aluminum - light

telephone - call

skull - bony

grape - purple

sugar - sweet

onion - peels

buckle - belt

freckle - faced

earthworm - crawl

vinegar - carmel

STUDY LIST II

DISTINCTIVE LABELING GROUP

grapefruit - yellow
grape - purple
aluminum - light
rattlesnake - poison
earthworm - crawl
skull - bony
onion - peels
fang - snake
vinegar - carmel
freckle - faced
telephone - call
cigar - ashes
sugar - sweet
zoo - keeper
tack - sharp
closet - dark

diamond - ring
pickle - green
snail - slow
eel - electric
pine - tar
sulphur - yellow
oyster - stew
baseball - hard
lizard - scaly
city - street
lemon - fruit
paste - sticky
cherry - red
badge - patrol
seaweed - stringy
buckle - belt

STUDY LIST III

DISTINCTIVE LABELING GROUP

badge - patrol
paste - sticky
oyster - stew
pine - tar
city - street
seaweed - strings
sulphur - yellow
snail - slow
cherry - red
closet - dark
buckle - belt
zoo - keeper
lemon - fruit
lizard - scaly
pickle - green
eel - electric

freckle - faced
tack - sharp
sugar - sweet
vinegar - carmel
skull - bony
telephone - call
earthworm - crawl
grape - purple
fang - snake
cigar - ashes
onion - peels
diamond - ring
aluminum - light
baseball - hard
rattlesnake - poison
grapefruit - yellow

NAME: ______________________________ SEX: ________

TEST LIST I

PREDIFFERENTIATION

DIRECTIONS: In the blank spaces write the word which belongs with each of the given words.

DISTINCTIVE LABELING | EQUIVALENCE LABELING

GRAPE________________________
LIZARD________________________
BASEBALL________________________
RATTLESNAKE________________________
PICKLE________________________
ALUMINUM________________________
SUGAR________________________
SKULL________________________
TELEPHONE________________________
EARTHWORM________________________
VINEGAR________________________
EEL________________________
ZOO________________________
FANG________________________
CLOSET________________________
LEMON________________________
TACK________________________
ONION________________________
OYSTER________________________
BUCKLE________________________
SULPHUR________________________
SNAIL________________________
PINE________________________
CITY________________________
FRECKLE________________________
PASTE________________________
GRAPEFRUIT________________________
CIGAR________________________
DIAMOND________________________
CHERRY________________________
BADGE________________________
SEAWEED________________________

NAME: ______________________________ SEX: __________

TEST LIST 2

OBSERVATION GROUP

PREDIFFERENTIATION

DIRECTIONS: Circle the words which were among those which appeared in the lists of words you have seen.

FANG
SKULL
TOWN
TIN
GRAPEFRUIT
FIR
BADGE
FROG
GARLIC
RADIO
NAIL
SULPHUR
ORANGE
MEDAL
PEACH
CIGARETTE
EARTHWORM
RUBY
SEAWEED
TELEPHONE
PASTE
CLIP
PICKLE
FLATWORM
CITY
SNAIL
EEL
GRAPE
CLOSET
LEMON
CIGAR
ZOO

FISH
CRAB
FOOTBALL
CIDER
MUSSEL
CHERRY
RATTLESNAKE
DIAMOND
CRANIUM
FRECKLE
PIMPLE
PINE
VINEGAR
ALUMINUM
LIZARD
FIN
ALUM
LIME
SUGAR
PRUNE
CABINET
OYSTER
COTTONMOUTH
GLUE
PLANKTON
CRUCIBLE
BASEBALL
TACK
ONION
BUCKLE
SALT
CUCUMBER

APPENDIX B

WARNER SOCIO-ECONOMIC SCALE

NATURE OF THE SCALE

Warner, Meeker, and Eells (1949) developed a social scale which predicts social class status accurately in more than 90 in 100 cases. The formula includes four major factors: occupation, source of income, house type, and dwelling area.

Detailed descriptions provide a basis for evaluating and rating the four factors on seven point scales. The following are the four factors and the various points which are assigned to each of the categories under a given factor.

FACTOR I - OCCUPATION

SCORE	
1	Professional and Proprietors of large businesses
2	Semi-professional and smaller officials of large business
3	Clerks and kindred workers
4	Skilled workers
5	Proprietors of very small businesses
6	Semi-skilled workers
7	Unskilled workers

FACTOR II - SOURCE OF INCOME

SCORE	
1	Inherited wealth
2	Earned wealth
3	Profits and fees

4	Salary
5	Wages
6	Private relief
7	Public relief

FACTOR III - HOUSE TYPE

SCORE	
1	Excellent
2	Very good houses
3	Good houses
4	Average houses
5	Fair houses
6	Poor houses
7	Very poor houses

FACTOR IV - NEIGHBORHOOD

SCORE	
1	Most exclusive section of town
2	Area well above average
3	Area "nice and respectable"
4	"Average" neighborhood populated mainly by working men
5	Area close to industry or railroad
6	Edge of slum
7	Strictly slum

The Warner et al. formula may be written as:

4 x Occupation = ______________________

3 x Source of Income = ______________

3 x House Type Score = ______________

2 x Neighborhood Score = ____________

Total score = Social Class Score

The total class status score is translated in social class equivalence by the following table:

TOTAL SCORE	SOCIAL CLASS EQUIVALENT
12 - 22	Upper class
25 - 34	Upper - middle class
37 - 50	Lower - middle class
54 - 63	Upper lower class
67 - 84	Lower - lower class

The reported multiple correlation of the four factors - occupation, source of income, house type, and dwelling area - with Evaluated Participation[1] is .972.

OTHER PROVISIONS OF THE SCALE

The authors have provided data which permit the scale to be used when one of the four factors is missing. The following table shows the weights which must be multiplied by the ratings on each of the three factors when one factor is missing.

---

[1]Evaluated participation is another technique for evaluating social class perfected by these authors. This technique involves ratings on matched agreement, ratings on symbolic placement, ratings on status reputation, ratings by comparison, ratings by simple assignment to a class and ratings by institutional membership.

TABLE 17.--Weights for computing social class when factor is missing.

FACTOR	Weight to be Used When One Factor is Missing			
	Occupation Missing	Source of Income Missing	House Type Missing	Dwelling Area Missing
Occupation		5	5	5
Source of Income	5		4	4
House Type	4	4		3
Dwelling Area	3	3	3	

FORM OF THE SCALE USED IN THIS STUDY

An abbreviated form of the Warner Scale was used in this study. Only three factors--occupation, house type, and neighborhood scores were used. The reported correlation of this trial with Evaluated Participation is .964.