THE EFFECTS OF EXTRINSIC REINFORCEMENT, ACHIEVEMENT MOTIVATION AND SENSORY MODALITY PREFERENCE ON VISUAL DISCRIMINATION LEARNING IN KINDERGARTEN CHILDREN

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CHAPTER I

INTRODUCTION

Statement of the Problem

The literature is abundant with studies featuring components of reinforcement theory. Much of this experimentation, however, was performed in the field of psychology, with little or no practical relation to education. Montessori (1912), Piaget (1954) and other educational theorists assume that education is intrinsically rewarding, requiring little or no external reinforcement to enhance performance. However, extrinsically based reinforcement appears to be unavoidable in teacher-child interaction situations. Brophy (1972) suggests that even if teachers attempt to avoid overt reinforcement, their evaluative reactions are, nonetheless, conveyed through minimal cues of tone, facial expression and gesture. This is especially true at the pre-primary school level. The basic question, "Should extrinsic reinforcement be used in education?" is strictly theoretical. Future attempts must be directed to determine what should be reinforced and specifically, what kind of reinforcement is most effective. With increased demands to match instructional methodologies to individual differences, the continued exploration of the effects of differential extrinsic reinforcement in combination with internal learner characteristics is essential.

Much effort has been directed toward the development of high-quality instructional systems designed to deal with the various problems prevalent in the classroom. For the most part, the curricular format of every instructional system must include: (1) the conditions for engaging the child in learning, (2) the organization of tasks to be learned, (3) the sequence of learning, and (4) the particular type of reinforcement to be employed (Hodges, 1972). The specific type of extrinsic reinforcement in any curriculum is an important aspect of the learning environment. It may also be an important element of pre-primary school education programs engaged in the development of academic readiness skills. As a result of continued emphasis on intervention at the pre-primary school level, careful empirical analysis of all possible applications of reinforcement theory to the solution of learning difficulties in young children appears necessary. The study of different types of extrinsic reinforcement at the pre-primary school level has not been extensive, and results that are available conflict.

One program directed by Gray, Klaus, Miller and Forrester (1966) used a predominantly material-based (candy, toys, tokens, etc.) mode of reinforcement with minority group children. The rationale used for this approach was that material rewards were not a significant part of the child's past history of reinforcement. In this respect, verbal reinforcement, namely personal praise, was considered less effective initially in motivating the child to learn.

Early empirical evidence supported the proposition that material rewards are more effective with culturally disadvantaged children. Terrell and Kennedy (1957) studied the reinforcing effects of a light flash alone, and in combination with four other types of reinforcement

on pre-primary school and elementary children's discrimination learning. They reported that learning was facilitated under a tangible (candy) reinforcement condition, with praise, token, reproof and the light flash alone yielding less successful results. Additional studies comparing the effects of various types of reinforcement and using alternate discrimination tasks report similar findings (Terrell, Durkin and Wiesley, 1959; Zigler and Delabry, 1962; Cameron and Storm, 1967; Hassett, 1970).

More recent studies have reported inconsistent results. For example, an investigation conducted by Unikel, Strain and Adams (1969) attempted to compare the effectiveness of material (candy) and social (verbal praise) rewards on pre-primary school children's learning. Based on the results, it was indicated that although both material and social reward facilitated performance on the learning task, no significant difference in their effectiveness was found. Tiber and Kennedy (1964), Cairns (1967), McGrade (1968) and Uselmann (1971) report similar findings. In all of these studies, various types of material and social modes of reinforcement were found to be equally effective.

On the other hand, Spence (1966), Spence and Segner (1967), Ferrell (1968) and Farber (1971) reported that their lower-class subjects performed more successfully based upon the administration of non-material rewards. This group of researchers proposed that verbal reinforcement is significantly superior to material rewards in the facilitation of conceptual discrimination learning. These results are in direct conflict with reports of material reward superiority previously stated.

Such major contradictions in the literature create a questionable

atmosphere for the implementation of any type of reinforcement system in pre-primary education. Program rationale can no longer be of a theoretical base exclusively. In light of experimental evidence, further research in the area of reinforcement is needed. This is especially true for early childhood education at the preschool and kindergarten level. As Good (1972) suggests, "the inconsistencies and contradictions which do exist cannot be reconciled with existing data and that new research must be undertaken to clarify the issues" (p. 253).

A unique feature of the present investigation is in its integration and evaluation of newly considered organismic variables: achievement motivation and sensory modality. To date, no such assessment of differential reinforcement effectiveness utilizing these variables has been reported. In the past, common considerations of intellectual functioning, socioeconomic status, task difficulty, ego level, and task differences have been employed with limited success. As Gagné (1970) points out, educators must adopt the position that instructional material development be based upon the needs of the individual. It is quite conceivable that the missing conditions are not to be exclusively located in the external environment, but are an integral function of internal individual characteristics related closely to the learning task itself.

Significance of the Study

An essential feature of the study is the useful application of its findings to present-day learning situations, specifically in the pre-primary school setting. With added emphasis continuously directed

toward individualized instructional experiences, the development of curricular materials based upon applied reinforcement techniques is an essential characteristic of educational programs designed to meet the needs of all students. Jensen (Gagné, 1967), for example, argues that if the appropriate recognition of individual differences is not realized, future application of psychological theory risks being directed toward the averaged characteristics of the group. This state of affairs may not fully represent idiosyncrasies that exist within the individual and subsequently reduce the overall effectiveness of conditions designed to enhance learning. In further support of these contentions, Underwood (1966) has called for the psychology of learning to establish individual differences as central to the theoretical issue rather than what he terms "pesky statistical problems" which may result from a marked variation in scores.

The recognition of both intra- and inter-individual differences, a theme central to the present research, is an attempt to evaluate past inconsistencies in reinforcement literature based upon the inclusion of achievement motivation and sensory modality preference as part of the theoretical framework. The relationship and overall significance of these variables to the learning environment has received widespread support. Kagan (1971), for example, emphasizes that the prominent feature in the educational experience of any child must include efforts to perpetuate the student's desire to learn. However, at the present time, an academic theory of achievement motivation and the subsequent guidelines necessary for the development of achievement-related behavior in children are not available in complete form.

Similar distinctions can also be attributed to the consideration

of differential instructional methodologies based upon sensory modality preferences in young children. The theory of modality preference contends that some individuals learn more efficiently through one sensory channel, be it auditory, visual or haptic, than through other pathways. Transfer of this concept to the educational setting suggests that matching a child's modality strength with an instructional method stressing that modality will facilitate learning. It appears that the identification of modality strength early in the primary school years may be essential to future academic success for some children. The theory also indicates that for a majority of children, the auditory and visual modality channels approach a general period of equalization in functioning at approximately seven to nine years of age (Wepman, 1968). However, if individual needs are not met prior to perceptual modality integration, severe academic deficiencies compounded through concomitant emotional involvement may result. Current instructional efforts should speak to preventive educational strategies designed to enrich the individual understanding of all children.

Additional significance attributed to the investigation is based upon the belief that results may be employed as a "decision-making tool" toward the establishment of a kindergarten curriculum containing an extrinsic reinforcement schedule of maximized effectiveness. The results of the study may be beneficial to the development of various programmed instructional systems. Teaching machines, audio-visual programs, individualized instructional units and other supplemental, multi-media approaches to learning rely heavily on the use of reinforcement and informative feedback techniques. Such instructional methods can greatly profit from the application of extrinsic

reinforcement, achievement motivation and sensory modality theory based upon sound experimental evidence.

Through current mainstreaming procedures, major efforts in education based upon the identification of individual differences are being employed to reduce the distance between those children labeled as "slow learners" and their more fortunate counterparts in the regular classroom. Through the utilization of effective systems of extrinsic reinforcement in learning, this task will be undertaken with increasing levels of success.

Purpose of the Study

The overall purpose of the study is to evaluate the differential effectiveness of verbal, concrete and combination verbal-concrete extrinsic reinforcement on subsequent visual discrimination learning in the kindergarten environment. In addition, the study will investigate the main and interactive function of two organismic variables identified as closely related to the learning task: achievement motivation (high versus low) and sensory modality preference (visual, auditory and no preference). The selection of the variables under consideration is based on the contention that matching instructional methods to individual learning differences will enhance the attainment of educational objectives with maximized efficiency. Previously, such multiple comparisons of reinforcement effectiveness utilizing these specific organismic variables have not been reported in the literature.

Definitions of Terms

Reinforcement

For purposes of the investigation, reinforcement will refer to the association of pleasure with an act, leading to the repetition or continuation of that act.

Extrinsic Reinforcement

Also described as external reinforcement, extrinsic reinforcement refers to the audible or visual feedback, verbal approval or concrete object mode available, contingent upon the appropriate performance of a child in response to the stimulus situation. It must result in an increase in response probability (Hodges, 1972). In addition, extrinsic reinforcement may be viewed as the final goal object of behavior initiated and directed by extrinsic motivation. Three types of extrinsic reinforcement were operationally defined for evaluation: verbal reinforcement (social approval and informative feedback), concrete rewards ("m&m" candy) and a combination verbal reinforcement-concrete reward condition.

Verbal Reinforcement

Also referred to as intangible reward or symbolic reinforcement, verbal reinforcement is described as all forms of feedback that are non-material in configuration. For purposes of the present investigation, verbal reinforcement is operationally defined as informative feedback ("Right," "Wrong") and social approval ("Very Good") administered by the experimenter immediately following the appropriate

response.

Concrete Rewards

Concrete rewards refer to all material objects administered based upon the performance of a positive or desired response. Concrete rewards are also described as tangible rewards or material rewards. Examples based upon experimental investigation include candy, tokens, toys, etc. For purposes of the study, concrete rewards were operationally defined as material reward in the form of a piece of "m&m" candy distributed by the experimenter immediately after a correct response.

Informative Feedback

Informative feedback provides information related to the accuracy of past performance based upon criterion objectives, and subsequently directs future performance toward an increase in correct response. Informative feedback usually consists of verbal statements concerning the degree of appropriate performance.

Achievement Motivation

Based upon the work of McClelland, et al. (1953), Atkinson (1957) and Atkinson and Feather (1966) and in the tradition of the "expectancy x value" framework, achievement motivation refers to a theoretical construct developed in explanation of individual differences in the arousal, direction, intensity and persistence of achievement behavior. Achievement-oriented striving is characterized by behavior in which there is competition with an internally-based "standard of excellence."

Sensory Modality

As defined by Bissell, White and Zivin (Lesser, 1971), sensory modality refers to a particular sensory system or perceptual channel utilized by the individual in his interaction with environmental stimuli. Specifically, the different sensory modalities compliment the sense organs employed in the act of seeing (visual), hearing (auditory), touching (tactile) and feeling internally (kinesthetic).

Sensory Modality Preference

Sensory modality preference designates that particular sensory input channel that is preferred by the learner in his interaction with the environment. Although a theoretical distinction between sensory modality strength (aptitude) and preference is recognized, clarification is provided through definition of an assessed strength as an individual learner preference. The overall strength of a particular sensory modality preference is established through psychometric techniques designed to differentiate levels of task performance based upon cumulative preference ranking scores within each modality.

Hypotheses

The objective of the present investigation was to evaluate the main and interactive function of extrinsic reinforcement, achievement motivation and sensory modality preference on subsequent task performance in the pre-primary school setting.

Based upon the overall exploratory nature of the study, the following null hypotheses were set forth:

1. There is no significant difference in visual discrimination task performance of kindergarten children under various extrinsic reinforcement conditions.
2. There is no significant difference in visual discrimination task performance of kindergarten children under two levels of achievement motivation.
3. There is no significant difference in visual discrimination task performance of kindergarten children under various levels of sensory modality preference.
4. There is no significant global interaction between extrinsic reinforcement, achievement motivation and sensory modality preference in predicting visual discrimination task performance in kindergarten children.
5. Level of achievement motivation will not significantly interact with extrinsic reinforcement conditions in predicting visual discrimination task performance in kindergarten children.
6. Sensory modality preferences will not significantly interact with extrinsic reinforcement conditions in predicting visual discrimination task performance in kindergarten children.
7. Level of achievement motivation will not significantly interact with sensory modality preferences in predicting visual discrimination task performance in kindergarten children.

Assumptions and Limitations

It was assumed in the present investigation that each of the experimental treatment conditions, specifically verbal, concrete and

combination verbal-concrete extrinsic reinforcement, provided a reinforcing effect to the promotion of learning. This assumption is based upon the recognition that in order to establish meaningful comparisons between experimentally manipulated variables, each level of extrinsic reinforcement should be of maximum effectiveness for that particular group. Selection of the levels of the stimulus variable was based upon recommendations outlined in previous research.

An additional assumption based upon the selection of achievement motivation as an organismic variable was the theoretical belief that achievement striving is clearly established prior to the child's enrollment in kindergarten. This contention is supported by McClelland (1958) and Atkinson (1958). Both authors report that individual differences in achievement motivation can be clearly assessed at the age of five years. Since all subjects participating in the study ranged between 5.4 and 6.2 years of age, measurements of achievement motivation utilized in the statistical analysis are assumed to be valid indicators of overall achievement striving.

A discussion of several specific limitations to the experimental effort appears relevant. Most notably, generalization of the findings appear limited by population characteristics. Subjects for the study were drawn from population representative of a single school district covering a limited geographical area. Consequently, any generalization of the findings should not be initiated without due regard for the unique characteristics of the participants in the present investigation.

In addition, generalization of the results of the study were equally limited by external validity problems inherent in the research design. What might be considered a "Hawthorne Effect" was most likely

present throughout the experimental procedures due to the unique mechanical aspects of the administration of treatment conditions. The effect produced by the novelty of the experimental setting was gradually reduced as the study continued. Since the sample was continuously being exposed to innovative learning experiences throughout the year, this effect may be considered generally minimized. However, the external validity problems and the special characteristics of the sample allow the generalization of experimental findings to be somewhat limited to regional kindergarten groups with similar experiences.

A final limitation of the research was derived from the fact that the sample size employed was marginally appropriate to facilitate statistical analysis of the variables employed. Specifically, the classification of subjects based upon sensory modality preferences established an uneven distribution of data frequencies within each cell. Statistical techniques providing estimates of some cell means were necessitated. However, since much of the research was exploratory in nature, this limitation does not appear to limit the usefulness of the findings.

CHAPTER II

REVIEW OF THE LITERATURE

Differential Extrinsic Reinforcement Effectiveness

Introduction to Reinforcement Theory

Within a school setting, extrinsically-based reinforcement may be conceptualized as operating under four basic contingencies: (1) reward-presented, (2) reward-withheld, (3) punishment-presented and (4) punishment-withheld. In theory, all four combinations may be utilized in the school learning environment. However, for the specific purposes of this research effort, reinforcement was evaluated under the "reward-presented" condition exclusively. Contingencies of reinforcement promoted as a result of the reward-presented concept are commonly referred to as positive reinforcement. Likewise, positive reinforcement is defined as any environmental event that increases the probability of reoccurrence of the specific behavior it follows. Hodges (1972) and Lipe and Jung (1971) suggest that positive reinforcement appears most helpful when the learning to be accomplished is very basic in nature. This approach aids in the development of pre-learning skills, especially for those students at the pre-primary school level.

The application of reinforcement theory is currently a predominant force in the educational technology employed in today's schools. The

development of curricular materials containing supplemental systems of reinforcement has enhanced a new era of instruction. Positive reinforcement can be administered in a variety of ways. To date, most common forms have included verbal praise, verbal information, social approval and concrete or material reward. Early education pre-primary school programs, specifically preschool and kindergarten, accurately reflect the multiple uses of reinforcement in the school setting.

Urlich, Louissel and Wolfe (1971) have demonstrated such innovative techniques through development of the "Learning Village" program. This learning environment for 2.5 to 5.0 year old children provides various types of reinforcement in an attempt to initiate and perpetuate desired behaviors. Social reinforcement such as praise and attentiveness to the child's positive behaviors was used extensively. A system employing the commonly used token economy concept was also established to satisfy the child's inherent need for material reward (e.g., a piece of candy). A basic assumption of the Learning Village was that positive reinforcement is more successful than negative reinforcement in the establishment of desired behaviors. This view is, likewise, central to current research efforts.

The Early Training Project for Children (Gray, Klaus, Miller and Forrester, 1966) was an earlier example of the application of reinforcement theory to the learning situation. Once again, positive reinforcement was generally thought to be more effective, especially in instances where new responses were being formed. As a direct outcome of the project, several observations for the effective use of reinforcement in dealing with culturally disadvantaged pre-primary school children were made. These include:

1. The culturally disadvantaged child generally receives less reinforcement for his behavior.
2. The reinforcement of the culturally disadvantaged child is somewhat less adult administered than that of the middle-class child.
3. The reinforcement the culturally disadvantaged child receives is most likely non-material.
4. The reinforcement of the culturally disadvantaged child is directed more towards inhibiting behavior than it is toward encouraging exploratory activities (p. 7-8).

In light of these observations, the authors of the Early Training Project suggested that rewards most successful initially with a culturally disadvantaged child will be immediate, positive and non-verbal. Material reward (i.e., toys, candy, etc.) is an example which is consistently used in present-day learning environments.

With a variety of reinforcement conditions available for use in the school setting, it is important to determine their effectiveness with specific populations of students. The remainder of the extrinsic reinforcement literature review will address the relative utility of several reinforcement conditions in the promotion of learning. General trends will be discussed and areas of disagreement and contradiction analyzed.

The Verbal Reinforcement Paradigm

In reviewing the literature relevant to this investigation, it is advantageous to initially consider findings in the area of verbal reinforcement. In general, the student most likely must utilize three

sources of information available to him if learning is to take place: (1) verbal or written directions, (2) some type of external stimuli and (3) informative feedback. Informative feedback provides information regarding the appropriate way the subject is expected to respond on future trials (the correctness of his response). It is important to note, therefore, that variations in the amount of feedback and the actual nomenclature of the reinforcement affect the overall task performance.

Studies designed to compare the types of Verbal Reinforcement Combinations (V.R.C.) have reported rather consistent results. In a landmark study in this area, Buss and Buss (1956) employed three V.R.C.'s to study their effect on conceptual discrimination learning in children. The experimenter reinforced each subject's response by saying "Right" after a correct response, "Wrong" after an incorrect response (R-W Condition); "nothing" for a correct response, "Wrong" for an incorrect response (n-W Condition); and "Right" for a correct response, "nothing" for an incorrect response (R-n Condition). Results indicated that groups receiving R-W and n-W reinforcement combinations both produce significantly superior performance when compared to the R-n reinforcement combination, and differed little from each other. Similar findings were reported by Miller and Moffat (1970), Curry (1960) and Spence (1966a.).

In a study at the preschool level, Spence and Dunton (1967) found that lower-class subjects reinforced by the "Right-Wrong" verbal reinforcement combination were superior in performance on a two-alternative discrimination task to subjects receiving the "Right-nothing" and "nothing-Wrong" combinations. Similar trends were reported by Meyer

and Seidman (1961). Although Meyer and Seidman did not obtain a significant difference in their comparisons, they did report a consistent superiority in the R-W reinforcement combination.

Such considerations are important to the present study. If comparisons between verbal and other non-verbal reinforcement conditions are to be meaningful, the selection of the most effective verbal reinforcement combination is essential. Results of studies employing verbal reinforcement combinations could possibly reveal implications for future research in the area of non-verbal reinforcement.

Empirical Evidence Related to Differential Reinforcement Effectiveness

A basic controversy prevalent in the reinforcement literature is in the determination of the most effective incentive for learning. Numerous types and combinations of reinforcement have been investigated. The manipulation of a variety of parameters including age level, socioeconomic status, intelligence and task complexity has led to serious contradictions in reported findings. In simplified terms, reinforcement can be conceptualized as a dichotomy consisting of either concrete rewards or symbolic reinforcers. Concrete rewards include such incentives as candy, tokens or toys. A light flash, bell, verbal praise or verbal performance-oriented information are all examples of symbolic reinforcers. In most cases, the study of the relative effects of reinforcement conditions is enhanced by the combination of several reinforcement techniques with a variety of subject- and task-oriented variables. Such manipulation of the experimental variables has led to increasingly complex designs and a consequent wide variation of

empirical findings.

In an early study performed by Terrell and Kennedy (1957), the effects of verbal praise, reproof, candy and token rewards on the learning of a simple discrimination task were investigated. The task involved the acquisition of a button-pushing response to the larger of two three-dimensional geometric objects. Subjects included in the study were 160 four, five, eight and nine year old children. All reinforcement conditions were accompanied by a light flash. Results indicated that the candy reward group was significantly superior in performance on the discrimination task to subjects receiving all other reinforcement conditions. Terrell, Durkin and Wiesley (1959) performed a similar study which included socioeconomic status of the child as an additional organismic variable. Subjects consisted of lower- and middle-class five, six, ten and eleven year olds. A strikingly significant interaction effect was found between reinforcement type and social class. Lower-class children performed significantly better under the material reward condition (candy) than when administered non-material reinforcement. Converse findings were reported for middle-class children. Cameron and Storm (1967), Cradler and Goodwin (1971) and Reiner (1972) all report similar findings in studies utilizing a variety of tasks as criterion measures.

Zigler and DeLabry (1962) compared the effectiveness of tangible rewards (a token to be exchanged for a toy) with intangible reinforcement (verbal information) on a concept switching card sorting performance task in six year old elementary school children. Three groups of subjects were used: lower-class, middle-class and educable mentally-handicapped children. Results confirmed the findings of previous

research. Middle-class subjects performed significantly better on the concept switching task under the intangible reinforcement condition. The lower-class and retarded children's performance was significantly improved under the tangible reward condition.

It appears at this point that concrete rewards in the form of candy were found to be significantly more effective in the promotion of learning in lower-class children. Hassett (1970) attempted to extend these findings by comparing the effectiveness of money, candy, personal praise, and performance-directed praise on a marble-dropping task in four lower-class cultural groups. The 72 subjects represented Anglo, Black, Navaho and Spanish-American elementary school children. Based upon the findings, the author indicated that candy differed significantly from the other three reward conditions. No interaction between cultural background and reinforcement condition was found. The contention that material rewards are more effective in lower-class children's learning was supported. Most importantly, the findings permitted generalization across cultural groups to be meaningful.

Implications based on empirical evidence that material reinforcement is markedly superior to other reinforcement contingencies in lower-class children's learning are suggested by Terrell, Durkin and Wiesley (1959). The authors argue that substantial evidence exists to indicate that parents of middle-class children place a greater emphasis on learning for learning's sake than do parents of lower-class children.

However, more recent research has not consistently found a superiority in the effectiveness of material reinforcers on lower-class children's learning. For example, Tiber and Kennedy (1964) were unable to report a significant social class difference in intelligence test

performance due to reinforcement type. White and Black seven-eight year old elementary school subjects were randomly assigned to four incentive groups: verbal praise, verbal reproof, candy reward and control. The Stanford-Binet Intelligence Test, form D-M, was used as the criterion measure. Specific experimental treatments were administered after each subtest. Results indicated that no significant difference between incentive groups was identified. Also, no interaction effect between incentive group and socioeconomic status was found. However, the author did report a significant main effect based upon overall socioeconomic status group performance.

Under this analysis, it was evidenced that White Middle-Class subjects were superior to White Lower-Class subjects in task performance. In turn, White Lower-Class subjects performed at a superior level when compared to Black Lower-Class subject performance.

In a similar study, Kulberg (1967) generally supported these findings using first, fifth and ninth grade children as subjects. Specifically, she did not find a significant social class difference in learning with respect to reinforcement condition. However, Kulberg did report superior task performance for first grade male children receiving a token in contrast to candy or verbal praise. The candy and verbal praise conditions were superior to the token and performance conditions for fifth grade boys. No differences were found for ninth grade subjects. Implications drawn from the research suggest that extrinsic reinforcement effectiveness may function differentially based upon age-specific characteristics of the subjects.

Cernius (1968), employing a card sorting task with lower-class boys from grades first to fourth, found differences between his

reinforcement conditions to be non-significant. An intangible reward was used in which the subjects were told "Right" after each correct sorting response and "Wrong" after each incorrect sorting response. In addition, a tangible reward condition was employed in which the intangible rewards plus token chips to be exchanged for toys acted as a combined incentive. Unikel, Strain and Adams (1969) replicated these findings at the preschool level, suggesting that reinforcement effectiveness based upon age-specific variables is, at best, tentative.

In a comparative study of reinforcement contingencies in preschool children, Teager and Stern (1969) reported non-significance in their comparison of a variety of extrinsically-based incentives facilitating task performance. Subjects utilized in the study consisted of 21 Black children from 45 to 65 months of age. The children were randomly assigned to three treatment groups: Treatment 1--token reinforcement (raisins), chemical feedback (green or red light flash indicating a correct or incorrect response), and verbal information; Treatment 2--verbal reinforcement (praise), chemical feedback and verbal information and Treatment 3--chemical feedback and verbal information only. A paired-associate task was employed as a measure of reinforcement effectiveness. An examination of the findings revealed that although token reinforcement proved to be more potent, differences did not reach a level of significance. Teager and Stern did observe, however, that none of the effective types of reinforcement appear necessary. He suggests that children can learn to use feedback stimuli as information signals and transfer their informative value to extremely different learning situations. This implies that the use of mechanical apparatus (a light flash, bell, etc.) in learning situations can prove to be

quite beneficial in the promotion of subsequent task performance.

Other comparative studies investigating a variety of reinforcement conditions again report similar findings. McGrade (1968) compared the performance of lower- and middle-class children on a size-shape discrimination task. No significant main or interaction effects were found in the comparison of verbal, visual (signal light) and material (candy) reward. Uselmann (1971) reported similar results in the comparison of material, physical (an embrace, hug) and verbal reinforcement on a marble-in-the-who game for preschool children.

A significant body of evidence, however, has been established to support the hypothesis that symbolic reinforcement, essentially verbal in nature, generates superior performance in both lower- and middle-class children's learning. Spence (1966) studied the effects of various response-contingent reinforcers on problem-solving behavior in children. Subjects of three age levels (four-five, seven-eight and ten-eleven) were selected from lower- and middle-class backgrounds. The experiment utilized three levels of reinforcement (Reward, Punishment and Reward-Punishment) and within each of these verbal reinforcers ("Right" and "Wrong") and non-verbal reinforcers (candy and a raucous sound). A two-alternative discrimination learning task was employed to measure reinforcement effectiveness. Based upon the results, the author reported that both middle-class and lower-class children performed better when administered symbolic rather than the material rewards. Spence and Segner (1967) replicated these findings with lower-class and middle-class eight and nine year old elementary school children.

Replication of such findings at the preschool level differed on several points. Spence and Dunton (1967) reported that not only the

candy-blank treatment condition but also the "Right"-blank (as opposed to the "Right"-"Wrong" and blank-"Wrong") verbal reinforcement conditions were markedly less effective in the facilitation of task performance. In addition, review of group means suggests that the lower-class preschool children performed at an equivalent level under both reward-punishment conditions. Results did confirm the inferiority of the candy-reward condition when compared to other forms of symbolic reinforcement for middle-class children.

Expanding this line of research, Spence (1970) once again observed a candy reward inferiority in an investigation of the effects of a light signal, bean (to be exchanged for candy) and candy on discrimination learning in lower-class and middle-class second and third grade children. The results clearly confirm the findings of the investigator's previous research on discrimination: The use of material reinforcers produces significantly poorer performance in task performance when compared to symbolic rewards. However, although not statistically tested, contention that both lower- and middle-class children found candy less motivating and rewarding then symbolic reinforcers appears questionable. Spence (1970) suggests that the specific reinforcement procedures employed with the children receiving candy rewards may have distracted their attention from the task. This "distraction effect" may possibly be generalized to include any reinforcement procedure using a mechanical apparatus in its administration.

In a test of the Distractibility Hypothesis, Ferrell (1968) reported that lower-class preschool children demonstrated a superior level of performance on a marble-dropping task under verbal reinforcement conditions. Subjects in the candy, negative verbal punishment and

the combined candy plus verbal reinforcement conditions performed at an inferior rate. Based upon the inclusion of the combination candy-verbal reinforcement condition, the findings imply that candy acted not only as an inferior reinforcer, but actually hindered performance. Teager and Stern (1969) also noted a distraction effect exemplified by his use of a variety of mechanical apparatus. He reported that his preschool subjects demonstrated a degree of emotional side effects during the testing sessions. However, such support for the distractibility hypothesis must be considered tentative based upon reports in the form of behavioral observations rather than experimental manipulation.

In examining the empirical evidence, it appears that the evaluation of the distractibility of specific response contingent rewards has not been adequate. Marshall (1969), in a study of 160 White kindergarten children, examined two classes of reinforcers--material and symbolic (verbal). As a measure of reinforcement effectiveness, the High S.E.S. and Low S.E.S. subjects participated in an interesting and uninteresting game (color discrimination task). The author reported that verbal reinforcement, when administered immediately, was effective for both High S.E.S. and Low S.E.S. groups. A distraction effect was noted in that material reward impeded the performance of both socioeconomic groups. The investigator suggests that an experimental design in which the material reward is given only after criterion is reached instead of after each correct response would significantly reduce the distractibility of the reinforcement. In addition to the distraction effect, an interaction effect between reinforcement conditions and task interest level was evidenced. The implication drawn from the research suggests that the type of task employed could be largely responsible

for many of the inconsistencies reported in the reinforcement literature. The contention of an inherent task-specific x reinforcement condition interaction was, likewise, supported by Spence and Dunton (1967); Unikel, Strain and Adams (1969); Cradler and Goodwin (1971) and Hodges (1972).

In a study conducted by Blair (1972), the major purpose was to evaluate the distractibility of material rewards under several different reinforcement procedures. Reward conditions administered to the nine year old subjects included consumable (candy), non-consumable (toy prize), token consumable (a bean for candy) and token non-consumable (a bean for a toy prize). In accord with the results, Blair indicated that all reinforcement conditions initiated similar levels of performance. In addition, no significant distractibility effects were identified. These findings do not support the contention of Marshall (1969) that material rewards administered under a system of token reinforcement would be less distracting than the distribution of consumable rewards immediately after each correct response. However, it is suggested that certain reinforcement conditions using token procedures may be less distracting than others. Spence (1970) reported that a light signal used as a token was less distracting than a bean as a token for lower-class children. The reverse was true for middle-class children.

The study of distractibility in reinforcement events was continued in an investigation at the preschool level by Farber (1971). The research compared the effectiveness of verbal and candy reinforcement on the learning of 72 lower-class Black children. A combination of the two reward conditions was also studied to determine if the material reward displayed a distracting effect. As a measure of reinforcement

effectiveness, a two-choice discrimination task using three-dimensional geometric figures was employed. Results were consistent with those reported by Spence and Segner (1967), Spence and Dunton (1967) and Ferrell (1968). The children's performance was superior under the verbal reinforcement condition in comparison to candy reward. Also, in agreement with Blair (1972), material reward was not found to act as a distractor inhibiting task performance. In light of the empirical evidence presented to this point, it would be appropriate to suggest that certain inconsistencies in the analysis of the distraction effect of material rewards on subsequent task performance warrants a reconceptualization of the issue.

The individual's past history of reinforcement is an additional parameter critical to the study of reinforcement effectiveness in learning. Baron (1966) suggests that ". . . it seems necessary to put less stress on the complex personality characteristics of the individual and more stress on the characteristics of the social reinforcement history itself (i.e., the frequency, intensity and variability of past social rewards)" (p. 527). Such a contention assumes that the individual's past history of social reinforcement establishes a personal baseline from which he assesses ongoing social reinforcement as it is presented. This individual preference level tends to influence the specific interactions between the individual and the reinforcing agent. Rieken (1962) refers to these interpersonal transactions as a process of continuous bargaining between the Subject and the Experimenter. At times, the Subject may not consider the reinforcer an adequate exchange for specific performance requirements expected of him. In addition, Uselmann (1971) argues that the administration of social reinforcement,

although intended to provide a positive incentive would inherently provide a negative condition if it is not in accord with the individual's previously established baseline level of reinforcement expectation. There appears to be three reasons to support such a statement:

1. Future disappointment--the subject feels he may not live up to the expectation and therefore fail himself and the reinforcing agent.
2. Guilt feelings--the reinforcing agent is being given a false impression of the capabilities of this subject and therefore the subject feels guilt.
3. Credibility of the reinforcing agent--the subject is wary of the source of reinforcement and is concerned about possible ulterior motives of the reinforcing agent (p. 4).

It seems clear that an individual's past history of reinforcement provides a potentially useful theoretical conceptualization related to the current state of his reward preferences. Such considerations may be extremely applicable to the determination of effective modes of reinforcement in learning.

Another factor, task complexity, appears to be related to some of the inconsistencies reported in the aforementioned studies. Farber (1971) made the observation that studies reporting tangible reward superiority for lower-class subjects employed marble dropping or sorting tasks. These tasks are relatively simple in their configuration. Comparatively, studies reporting a general inferiority of tangible reward effectiveness used size discrimination and concept switching tasks which are clearly more difficult. Spence and Dunton (1967) also suggested the existence of an interaction effect between reinforcement

condition and task difficulty.

In a test of the hypothesis of task-specific differences in reinforcement effectiveness, Kirwin (1968) directly investigated the effects of task difficulty on learning. In a study involving lower-class second and third grade children, a discrimination or conceptual task at two levels of difficulty was administered. Reinforcement conditions included material (light and candy) and non-material (light flash only) reward. Contrary to expectations of a task complexity x reinforcement condition-interaction effect, no significant differences were found. Perhaps a replication of the study using verbal reinforcement as the non-material reward condition would enhance the findings.

In a comprehensive, multidimensional study of reinforcement effectiveness, Reiner (1972) investigated the independent and interactive effects of several variables apparently related to learning. These included the type of reinforcement, type of task, grade level, social class, and sex. Lower- and middle-class subjects from the first, third and fifth grades were administered a sample of problem-solving and motor-learning tasks. Three reinforcement conditions were administered; namely, knowledge of results (correct and incorrect), social reinforcement ("you're doing fine," "very good") and material reinforcement. Indicative of the general findings presented in the literature, a four-way interaction between type of reinforcement, type of task, social class and grade level was found. Implications drawn from these results indicate that broad generalizations of reinforcement theory to learning situations are relatively limited at the present time. With the knowledge of the main and interactive effects of these and other variables, it may be possible to employ the most effective reinforcers

for particular children on specific tasks. Table I provides a summary of the experimental evidence reported in the discussion to this point. In conjunction with the literature review, Table I provides sufficient clarification to justify the need for further experimental effort directed toward the extrinsic reinforcement conceptual framework.

Due to the rather large array of inconsistencies reported in the literature, the author (Litwin, 1974) attempted to study the differential reinforcement effects of four levels of extrinsic reinforcement. The sample for the study consisted of 28 disadvantaged preschool children enrolled in the Project for Infant Development and Evaluation (P.R.I.D.E.) at West Chester State College. A Latin Square Design was employed as the experimental design and method of evaluation. Levels of the experimental treatment condition included verbal, visual, auditory and gustatory reinforcement. Overall treatment effectiveness was measured by subject performance scores on four two-choice discrimination learning tasks. These instruments were specifically constructed for use with the sample participating in the study.

Testing was accomplished during a four-week period. Measurements of treatment effectiveness were operationally defined as the total number of correct responses for each subject on each of the four tasks. Primarily functioning as a treatment condition, verbal reinforcement supplied information concerning the correctness of the response and performance-directed praise. Visual, auditory and gustatory reinforcement was represented by a green light flash, a ringing bell and the distribution of a sugared cereal, respectively; all presented upon a correct response.

Based upon the results of the study, it was suggested that each

TABLE I

SUMMARY OF STUDIES REVIEWED RELATED TO THE DIFFERENTIAL EFFECTIVENESS OF EXTRINSIC REINFORCEMENT

Year	Author	CA	LC-MC		Task	Treatments	S	NS	Comments
1957	Terrell and Kennedy	4-5, 8-9	X		Disc.-Button Pushing	(VP, VR, M, T) Light Flash	X		M (Candy) Hassett (1970)-MC
1959	Terrell, Durkin and Wiesley	5-6, 10-11	X	X	Disc.	KOR, M	X		KOR > M for MC
1962	Zigler and DeLabry	6	X	X	Concept Switching	KOR, T	X		KOR > T for MC; T > KOR for LC, EMH
1964	Tiber and Kennedy	7-8	X	X	Stanford-Binet	VP, VR, T, Control	X		MC (White) > LC (White) > LC (Black)
1966	Spence	4-5, 7-8, 10-11	X	X	Disc.	Reward (KOR, M), Punishment (Auditory), Reward + Punishment	X		KOR > M
1967	Kulberg	6, 10, 14	X	X	Paired Associate	VP, KOR, T, M	X		T > M, VP, KOR (1st grade boys); M, V > T, KOR (5-th grade boys)
1967	Spence and Dunton	5	X	X	Disc.	KOR, M	X		KOR > M for MC
1968	Cernius	6, 9		X	Card Sorting	KOR, KOR + T		X	Unikel, Strain, Adams (1969)-preschool
1968	McGrade	7-8	X	X	Disc.	V, Sy, M		X	Uselmann (1971)-Preschool
1968	Ferrell	4-5	X		Marble Drop	VP, VR, M, VP + M	X		VP > VR, M, VP + M *Distractibility Hypothesis

TABLE I (CONCLUDED)

Year	Author	CA	LC-MC		Task	Treatments	S	NS	Comments
1968	Kirwin	7-8	X		Disc.; Conceptual	M (Candy + Light), Sy (Light)		X	*Distractibility Hypothesis: NS
1969	Teager and Stern	4-5		X	Paired-Associate	(1) T, Sy, KOR (2) VP, Sy, KOR (3) Sy, KOR		X	Raisins, Green/Red Light
1969	Marshall	5-6	X	X	Color Disc.; Interest Level	VP, KOR, M	X		Task × Reinforcer VP, KOR > M for MC Immediate VP > Delayed M
1970	Spence	7-8	X	X	Verbal Disc.	KOR, M, T	X		KOR > M
1971	Farber	3-5	X		Geometric Figure Disc.	VP + KOR, M, VP + KOR + M	X		VP + KOR > M, VP + KOR + M > M *Distractibility Hypothesis: NS
1972	Blair	9		X	Disc.	M (Toy, Candy); T, VP, KOR	X		*Distractibility Hypothesis: NS VP, KOR > M
1972	Reiner	6, 8, 10	X	X	Motor; Problem Solving	VP, KOR, M	X		Reinforcer × Task × SES × CA

VP = Verbal Praise
VR = Verbal Reproof
M = Material
T = Token
KOR = Knowledge of Results
Sy = Symbolic (Light Flash, Bell)

MC = Middle Class
LC = Lower Class
S = Significant
NS = Non-significant
CA = Chronological Age
Disc. = Discrimination

level of the treatment condition provided some degree of reinforcing value in the promotion of discrimination learning. Non-significant main effects were found for group and occasion differences. Results did indicate a significant experimental treatment main effect at the 0.01 level. It was found that the verbal reinforcement condition was superior in performance to the visual, auditory and gustatory reward conditions. All other multiple comparisons of treatment effectiveness yielded non-significant results.

In addition to the analysis of main effects established prior to the study, a post hoc analysis was performed comparing reinforcement preferences for high and low achievers based upon task performance scores. The assessment found inconsistent results at the two achievement levels. Low achievers were found to perform equally well under all reinforcement conditions. High achievers, on the other hand, demonstrated a significantly superior level of performance under both verbal and gustatory (concrete) reinforcement. In addition, the effectiveness of these two conditions differed little from each other. Upon inspection of the raw data, it was theorized that such differences in the findings between high and low achievers were attributed to the relatively high frequency of chance level scores included in the analysis. The theoretical implications suggested by this development appears of crucial importance if clarification of the empirical data is to be realized.

The major findings of the author's previous research support the theoretical positions put forth by Spence and Segner (1967), Ferrell (1968), Farber (1971) and others: Verbal reinforcement was significantly more effective than material rewards in the promotion of lower-

class preschool children's discrimination learning. However, several observations during the administration of treatment conditions warrant further discussion.

Although Litwin (1974) did not statistically test the function of material rewards as a distractor of attention, behavioral observations tend to provide further evidence of the occurrence of the phenomenon in the experimental setting. In concurrance with evidence gathered by Spence (1970) and Teager and Stern (1969), observational data clearly suggests an overall distractor-effect based upon presentation of non-verbal forms of extrinsic reinforcement. The mechanical aspects of the reward conditions: the light, bell and distribution of cereal, appeared to provide the opportunity to allow competing responses to interfere with subject performance. On the other hand, the verbal reinforcement condition appeared to provide the attention focus and informational feedback necessary to insure superior performance. However, speculation of this nature must be replaced with empirically-based support. Discrepancies in the literature concerning the distractor effect of concrete rewards as an inhibitor of task performance is in need of further systematic analysis.

The adoption of the classifications "High Achievers" and "Low Achievers" as a supplemental evaluative technique was selected for several reasons. Initially, such statistical analysis was performed in order to obtain an additional level of agreement with the main findings of the study. Evaluation by achievement level also permitted a closer study of the impact generated by chance level scores on the analysis of treatment effectiveness. In addition, several studies have reported an interaction effect between achievement level and reinforcement

condition. McKeachie (1973) found that higher achieving children perform better under verbal reinforcement conditions, while low achievers learn better when they receive material rewards. These results are generally supported by Blair (1972) and Zigler and DeLabry (1962). The earlier study did not support these contentions. No significant differences were found between verbal and material reinforcement for both high and low achievers. However, due in part to the relatively small sample size employed in the analysis, these findings should not be adopted without reservation.

Most importantly and based upon the results obtained from the achievement level analysis, it may be argued that chance level scores had a significant effect on the outcome of the study. Although low achievers performed equally well under all treatment conditions, high achievement subjects were significantly superior in performance during verbal and gustatory reinforcement. What was expected was a similar distribution of treatment effectiveness at both achievement levels as found in the full sample size analysis. That is, verbal reinforcement was expected to be significantly more effective than visual auditory and gustatory reinforcement in children's learning. Such discrepancies in the results of the two forms of evaluation make apparent the impact of including chance level scores in the statistical analysis. The inclusion of chance level scores in the evaluation of reinforcement effectiveness appears to constitute a major methodological flaw in reinforcement theory research. In all probability, the interaction of task differences with the selection of motivational devices is responsible for much of the inconsistencies reported in the literature. The utilization of an unclear or relatively difficult learning task could

provide data containing an excessive number of chance level scores.

Most assuredly, the determination of effective modes of reinforcement is a complex issue. Reinforcers have been found to interact with a variety of subject and situational variables to establish level of performance. At present, the generalizability of reinforcement theory appears to be limited to particular subjects on specific learning tasks. Further research in the area of differential reinforcement effectiveness utilizing a wide array of variables in the identification of individual differences appears warranted. Such efforts are essential to the advance of educationally-based instructional technology beyond its present state.

Achievement Motivation

Introduction to Achievement Motivation

In the previous section, the research evidence, although somewhat inconsistent in its specific behavioral predictions, does advance sufficient justification toward the utilization of extrinsically-based incentives to increase academic performance. In a similar fashion, most educators will agree that an additional significant variable affecting classroom performance is the student's inherent motivation toward achievement when confronted with an academic task. However, at the present time, theoretical speculation and empirical evidence concerning the understanding, prediction and subsequent control of classroom performance is, at best, incongruous. Currently, theoretical concerns have not been adequately translated into a language useful to the classroom teacher.

These unsuccessful efforts to apply psychological theory to educational situations have not led to a systemic academic theory of achievement motivation. Kagan (1971), for example, argues that the initial step in the educational experiences of any child must be to either enhance or maintain his desire to learn. Continued efforts at the development of achievement-related motivation toward academic success in school is of paramount importance. Efforts in this direction must readily include consideration of environmental factors, e.g., extrinsic system of reinforcement, in support of achievement-oriented behavior. Such efforts should be included as a major component in current curricular and instructional programs. Attainment of this goal is certainly a complex problem. However, if education is to deal effectively with individual differences in children, environmental conditions, including the differential effects of reinforcement, must be carefully aligned with the internal characteristics of the learner.

In recent years, researchers have become increasingly interested in the developmental precursors of achievement motivation. Smith (1969), for example, suggests that a high level of achievement motivation, at least in boys, is most likely attributed to (1) relatively early parental demands for accomplishment; (2) affectively oriented rewards for achievement, specifically physical attention and socially-oriented verbal praise; (3) high level goal setting for children by their parents; (4) a positive parental rating of the son's overall competence in achievement situations and (5) continuous support toward the son's achievement efforts. These developmental predecessors to the development of a high level of achievement motivation within the male population suggests that, in fact, the individual's history of

reinforcement, primarily social in nature, may directly influence subsequent reinforcement effectiveness and achievement-related performance in the academic areas. Inconsistencies in the study of reinforcement effectiveness may be partially evaluated through consideration of individual differences in developmental experiences leading to divergent levels of achievement motivation. It is theoretically possible that those children provided experiences in promotion of achievement activity also possess a predisposition toward socially-based external reinforcement rather than material or concrete rewards. It can be further argued that children of high achievement motivation may show a learned preference toward socially-oriented reinforcement and praise.

The theoretical implications discussed by Crandall, Preston and Rabson (1960) suggest further consideration of etiological factors relevant to the development of achievement motivation in children. The authors define as essential criteria of primary importance the overall structuring of performance standards and consistent parental demands for achievement-related behavior. The authors further argue that such demands, manipulated through the administration of specific rewards and punishments, are essential to the development of achievement strivings in later life. Here, the motivation to achieve is being conceptualized as a hypothetical construct in explanation of certain aspects of achievement-oriented behavior not attributable to current intellectual abilities.

A Theoretical Model of Achievement Motivation

Theoretically defined by Atkinson (1957, 1964) and Atkinson and Feather (1966), achievement motivation is assumed to relate specific

characteristics of motivated behavior to the interaction of transient situational dispositions (expectations and incentive values) and the comparatively stable personality traits (motives). This particular theoretical position has its origin in the "expectancy x value" motivational framework, involving somewhat similar constructs. Since the function of this study does not include a test of the internal consistency of the achievement motive, a brief review will be provided. For a detailed account and general support of the theory, the comprehensive literature reviews provided by Korman (1974) and Maehr and Sjogren (1971) should be consulted.

The general theoretical framework of the achievement motive is based upon the assumption that in achievement situations, all achievement-oriented behavior is closely tied to situationally specific approach-avoidance conflict tendencies. The overall direction of achievement striving is established under two precipitating conditions. Individuals whose tendencies to approach success are greater than their tendencies to avoid failure will direct behavioral activity toward achievement goals at a moderate level of difficulty. Conversely, those who experience a dominance of tendencies to avoid failure over tendencies to approach success will subsequently avoid the achievement-related task in question. In line with this conceptual effort, Maehr and Sjogren (1971) further argue that these internal motivational tendencies toward task performance are an integral component of the person's enduring personal orientation, and their overall strength will vary between individuals. In addition, these conditions are significantly influenced by extrinsically-based factors such as contingencies of reinforcement, affiliative drive, and other situationally-determined

variables.

In addition to the individual's internally-based predispositions to approach success (M_s) or to avoid failure (M_{af}), the overall strength of the approach-avoidance tendency can also be determined, in part, by the specific environmental incentives available. These include the incentive value for success (I_s), the incentive value for failure (I_f), the subjective probability of success (P_s) and the subjective probability of failure (P_f) when confronted with a given activity. As demonstrated in the summary of the model provided above, these conditions assume that the value factor (I_s, I_f) is rigidly dependent upon the function of the expectancy factor (P_s, P_f). Specifically, the incentive values of success and failure are hypothesized by Atkinson as inverse linear functions of the probability of success and failure at task performance.

From the theoretical development presented thus far, Atkinson (1957) set forth the completed form of the initial model:

$$T_a = (M_s \times P_s \times I_s) - (M_{af} \times P_f \times I_f)$$

where T_a is defined as the overall active impulse to undertake a particular achievement-oriented activity. Hence, it logically follows that T_a is positive when $M_s > M_{af}$ and negative when $M_{af} > M_s$. The primary motivational drive, in combination with situationally specific subjective expectations for success or failure, initiate the resultant motivational tendency to either approach or avoid the achievement situation. The major overriding hypothesis is that, in achievement situations, persons characterized as $M_s > M_{af}$ will demonstrate lowest motivation where $P_s = 0.00$ or 1.00 and highest motivation where

$P = 0.50$. Furthermore, persons for whom $M_{af} > M_s$ will theoretically demonstrate lowest achievement striving at $P = 0.50$.

However, other authors (Oconner, Atkinson and Horner, 1966) report conflicting results, providing noteworthy concern toward the relationship. In a variety of empirical investigations utilizing "persistence" behavior in a test situation, evidence led to the conclusion that M_{af} subjects have not shown consistently poor performance at the moderate difficulty level. To account for such discrepancies in the literature, Atkinson and Feather (1966) provide what might be considered an "error term" (T_{ext}). These "extrinsic motivational tendencies" consist of tendencies to engage in the relevant activity for reasons other than a concern for achievement. Further evaluation of the T_{ext} construct is essential to the prediction of academic performance levels based upon predispositions toward achievement motivation.

The concept T_{ext} represents a more recent acceptance of the fact that a variety of social contexts often arouse non-achievement motives in the achievement-related situation, and subsequently lead to successful task performance. These externally based tendencies are not generally associated with pride in achievement as such and may include, for example, motives to comply or to seek approval. From this discussion, it is clear that the theory predicts that any individual may try to achieve in a given situation. The difference is observed in the fact that the level of achievement behavior will differ as a function of both individual and environmental variation. It follows that the environmental context may appear quite different for the M_s and M_{af} groups. Most importantly, any experimental test situation inherently provides specific extrinsic constraints or demand characteristics that

influence task performance regardless of internal levels of achievement motivation.

Empirical Evidence Related to the Achievement Motivation Conceptual Framework

If education is to be provided with a reliable theory of achievement motivation applicable to problems in the regular classroom, increased experimental efforts appear warranted. Essentially, empirical support is, at best, mixed in determining the relationship between achievement motivation and academic performance. In line with the reviews mentioned previously (e.g., Korman, 1974; Maehr and Sjogren, 1971), an early study conducted by Rosen and D'Andrade (1959) provides what might be considered a typical example in support of the achievement motivation-performance relationship. The authors used nine to eleven year old boys found to be high in achievement motivation as subjects for their investigation. Results supported the theoretical predictions. Those subjects high in achievement motivation performed with greater success on academic tasks requiring the stacking of blocks, anagrams and the construction of patterns. Research initiated by Cox (1962) adds further support to these results in a study utilizing fourth and fifth grade Australian children. Subjects possessing high achievement motivation scores achieved superior performance on school-related achievement tasks and were more often placed in the high-level ability groups.

A great deal of research has been generated in recent years, however, that does not provide support for the theoretically hypothesized relationship between achievement motivation and subsequent task

performance. In one study, for example, Crandall, Katkovsky and Preston (1962) reported equal performance among elementary school children in reading and arithmetic regardless of their level of achievement motivation. The authors further reported no significant differences between high and low achievement motivation children in their persistence toward tasks measuring intellectual ability. Consequently, it may be theorized that such inconsistencies may likely be the result of a variety of situational factors (T_{ext}) that provide significant influence in the arousal of the motivational component and determination of external reward probabilities. Although research testing these hypotheses has been reported, little evidence is available utilizing subjects under the age of adolescence.

In an earlier endeavor, Douvan (1956) assessed the interaction of social status, extrinsic reward and achievement strivings in adolescents. The author submits that success-failure cues for middle-class children should, regardless of the existing situation, elicit a generally consistent set of behaviors irrespective of the extrinsic reward conditions of the situation. She argues that "since working-class children are taught achievement strivings neither so early or so systematically, their reactions to success-failure cues should be more responsive to changes in the reward potential of the situation in which such cues occur" (p. 219). Here Douvan suggests that there exists a significant differential reinforcement effect for working-class children, and consequently, the achievement motivation-performance relationship may be altered.

Douvan's study attempted to evaluate the differential effects of reward potential found in two success-failure situations on the

subsequent degree of achievement striving manifested by middle-class and working-class adolescents. The two treatment conditions experimentally manipulated consisted of one situation in which success was defined as achieving an abstract norm; while in the second situation, successful performance was enhanced through administration of a material reward (monetary). The hypothesis set forth addressed the proposition that achievement striving would evidence differential effects under the two reward conditions. No differential effects were expected for the middle-class participants.

Based upon the experimental findings, the author reported support for the hypothesis under study. More autonomous and generalized success strivings were evidenced by the middle class, while achievement strivings characteristic of the working-class subjects were found dependent upon situational factors, namely the type of rewards available. Significant differences between working- and middle-class subjects were observed under the Material Reward-Absent condition, the middle-class subjects scoring higher. However, no significant differences in achievement striving was evidenced when material rewards were present.

The theoretical implications drawn from the Douvan effort suggest that achievement strivings in adolescents show a significant socioeconomic bias in favor of the middle class. Similar theoretical distinctions have been made by other authors. In one study, for example, Crandall (Smith, 1969) argues that the middle-class child is characterized as one who is supported and urged toward individual achievement. Parental achievement-oriented expectations based upon peer comparison and the administration of symbolic (verbal praise and approval) as well as material rewards do much to enhance the development of achievement

motivation in their children. Subsequent behavioral activity includes consistent responses to success-failure cues regardless of the overt potential for significant extrinsic reward. Experiences similar in nature are rarely provided consistently by the parents of working-class youth. His overall motivation to achieve is essentially related to the existence of material rewards within the achievement situation. A final implication of the study suggests the possibility that under certain facilitative conditions (e.g., the effective use of extrinsic rewards), academic achievement striving may be enhanced for populations showing a marked developmental history difference.

In a similar investigation conducted with first-grade children, Mumbauer (1970) evaluated the effect of situational variables on subsequent persistence behavior. Subjects included in the study, differing in educational and socioeconomic backgrounds, consisted of disadvantaged children attending the DARCEE preschool program for approximately 2.5 years. A middle-class sample and two additional disadvantaged samples with no preschool experience were selected as comparison groups. Two situational variables, task difficulty and the presence or absence of a concrete reward, were of primary interest. The hypotheses in question included the expectation that both middle-class and DARCEE children would demonstrate significantly superior persistence activity on tasks initially described as easy in comparison to disadvantaged subjects lacking the benefit of a preschool experience. In addition, the non-DARCEE preschool subjects were also anticipated to persist longer when offered a concrete incentive for task performance. No differential effects were predicted for the DARCEE and middle-class group when under the concrete reward treatment

condition.

However, statistical treatment of the data did not support the predictions. No significant differences were found to exist between the four sample groups in their performance in the hard-easy and reward-no reward conditions. In contradiction to the findings provided by Douvan (1956), no differential effects in persistence on an academic achievement task were evidenced between middle- and lower-class first grade subjects. However, since the Douvan investigation employed adolescents as subjects while the present study evaluated the situational variables with first grade children, it may be theorized that a potential interaction between age level and achievement striving behavior may be responsible for the conflicting results.

The analysis of the achievement motivation model in relation to performance measures has provided inconsistent, inconclusive results at best. In a review of the literature provided by Maehr and Sjogren (1971), the authors report no consistent relationship between achievement motivation and performance. Klinger (1966), in an earlier but much more comprehensive assessment of the problem, suggests that two classes of evidence are pertinent to the initial analysis of the relationship. This recommendation includes (1) molar, consisting of relatively long-term patterns of behavior and (2) relatively short-term task-oriented measurements involving merely brief statements of behavior. These task instruments are most often administered shortly after achievement motivation measurements.

Klinger's literature review included studies utilizing the three most frequently employed projective techniques of achievement motivation assessment: The Thermatic Apperception Test (TAT) developed by

McClelland, et al. (1953), the French Test of Insight (French, 1958a) and the Iowa Picture Interpretation Test (IPIT) offered by Hurley (1955).

In evaluating the empirical evidence relating achievement motivation to molar performance measures, only 17 of 32 studies investigated reported results in the predicted direction. Through further analysis, it may be argued that two variables are significantly responsible for the reported inconsistencies, namely the subjects' sex and age level. Klinger reports that research utilizing female participants generally suggest non-significance for the theoretical achievement motivation-performance relationship, based upon molar performance scores. In addition, studies evaluating the subjects' age find that nine out of ten reported relationships suggest significance when employing high school age or younger children. However, nine out of sixteen studies reviewed with subjects of college age or other adult males report results that are non-significant. From these findings, Klinger comments that "nothing in the existing theoretical structure of achievement motivation suggests such an age-related difference" (p. 295). In addition, it should also be noted that, to date, no studies involving pre-primary school age children have been reported. The apparent gap in the literature is of extreme importance in relation to the present investigation.

Continuing with a review of Klinger's analysis, the author reports that the second major class of studies concerned with the achievement motivation-performance relationship as measured by tasks of relatively brief duration find that approximately half of the studies reported predominantly significant relationships. As in the first analysis, two

variables are hypothesized as providing an instrumental difference in the research findings. Specifically, the results depend partially on the instrumentation used to measure the achievement motive. For example, the French Test of Insight primarily provided a uniform, consistent set of theoretically sound relationships. Conversely, the TAT and IPIT instrumentation utilized in similar studies supplied reports of a higher incidence of non-significance.

It is further argued that task-oriented studies also provide evidence of an instrument x sex interaction. Specifically, in those studies employing the TAT, a high percentage employing male subjects reported significant findings. The reverse was true with the IPIT. Unlike the research efforts employing molar measures of performance (e.g., grades, occupational success, etc.), the task specific indices reported no apparent effects of subjects' age on the subsequent achievement motivation-performance relationship. It might be concluded that the prevalence of inconsistencies make generalization of the theoretical framework to the academic setting extremely difficult.

In light of the inconsistencies similar in nature to those discussed by Klinger (1966), Atkinson and Feather (1966) found it essential to provide an explanation suitably integrated into previous conceptualizations of the achievement motivation model. The final nature of the revision argued that total motivation to perform the initial achievement task is attributable to the following component motivations: (1) achievement-related motivation to perform the task and (2) extrinsic motivation to perform the task (T_{ext}). Consequently, it may be theorized that the components of the total motivation to perform an

initial task rather than any alternative is represented as follows:

Initial Task			Alternative Task		
Achievement-related Motivation	+	Extrinsic Motivation	>	Achievement-related Motivation	+ Extrinsic Motivation

Conversely, it is further hypothesized that an individual will turn to an alternative task when

Initial Task			Alternative Task		
Achievement-related Motivation	+	Extrinsic Motivation	<	Achievement-related Motivation	+ Extrinsic Motivation

(p. 119)

One of the critical situational determinants must be considered the overall strength of the extrinsic motivation component. In recent years, investigators have put forth increased effort toward evaluating the relationship between intrinsic and extrinsic motivation. As presented in the Atkinson and Feather revision, it may be theorized that the internal and external components combine to yield a total motivational force. A great deal of evidence has been generated to support the assumption that behavior does increase with the administration of extrinsically-based rewards (Deci, 1971, 1972, Lepper, Green and Nisbitt, 1973). These results seem to place increased emphasis on the supplementary effects extrinsic rewards demonstrate toward the total behavioral activity of the individual. In a further evaluation of this position, Korman (1974) argues that the administration of money and verbal reinforcements, both considered extrinsic incentives, are not the same in their effects and in their interactions with other

reinforcers. In other words, the use of money and verbal reinforcement alone does not provide the same effect as using the two incentives in combination. Subsequently, Korman theorizes that "If we wanted to use the expectancy x value theoretical position for influencing the achievement-oriented behavior of school children, this problem would be a very meaningful one in trying to decide on a strategy for exercising such influence" (p. 201). The extrinsic reward phenomena is of great interest to the present research investigation.

Smith (1969) provides a viable explanation for the situation in which an individual characterized as low in achievement motivation continues to perform academically above expectancy. In accord with the theoretical position of Atkinson and Feather (1966), Smith further argues that unless rigorously controlled, factors defined as extrinsic motivational variables (e.g., extrinsic rewards, incentives, social approval, praise, etc.) may significantly alter academic performance for some students. It appears that although experimental efforts to construct a pure theory of achievement motivation have some merit, application to the educational setting is not practical without first incorporating a variety of other situational considerations. Such speculation is supported by the fact that children low in achievement motivation perform admirably when individually selected incentives are provided.

The theoretical implications promoted by Horner (1971) provide additional support. She reviews several studies that failed to find a significant relationship between achievement motivation and academically-related performance. Such experimental efforts are likely confounded when extrinsically-based motives or incentives are provided.

In addition, the studies in question have been primarily performed with adults and adolescents, making generalization beyond that population limited. Horner continues by asserting that ". . . individuals attracted to these incentives but otherwise low in intrinsic achievement motivation can and do in fact behave very much like high achievement motivation individuals. . . They show a pattern of moderate 'entrepreneurial' risk taking behavior. . ." (p. 48). Horner recommends from this discussion that it is extremely important theoretically and methodologically to evaluate the effects of extrinsic motives and incentives on subsequent academic task performance.

Due to the rather wide range of inconsistency and complexity reported in the literature, Klinger (1966) provides what appears to be a theoretically appealing argument as partial explanation of the achievement motivation-performance controversy. Continuing with his comprehensive review of the literature, the author asserts through further analysis that an ample variety of administrative conditions prevail in the task performance (short term) measurements to allow comparisons concerning the effects of achievement cues in moderating the achievement motivation-performance relationship. For purposes of evaluation, Klinger classified all task performance studies based upon the conditions of the projective instrument administration, "neutral" or "achievement aroused." Likewise, task administration differences were categorized as either "neutral," "achievement aroused" or motivated by "extrinsic or multiple incentives." Extrinsic incentives included monetary rewards, permission to leave the experiment early, or electric shock avoidance. The multiple incentive classification provided evaluation of the studies employing both achievement arousal and extrinsic

incentives in their procedural format.

The results of the data analysis provided by Klinger appear noteworthy. Three combinations of the six possible classifications of arousal condition, two for the projective instrument and three for the task characteristics, accounted for 52 of the 57 studies evaluated. In addition, of the 52 studies so classified, 25 reported statistically significant relationships between achievement motivation and performance. Specifically, the "neutral-neutral" projective instrument/task administration produced significance 12 out of 24 times, "aroused-aroused" only 3 out of 13 times, with the "neutral-aroused" condition reporting significance 10 out of 15 times. In addition, the summative data appears to be independent of an instrumentation or subjects' sex interaction. Klinger suggests that the evidence supports the position advanced in the McClelland-Atkinson theoretical framework. The high incidence of achievement motivation-performance relationships reported as significant under the "neutral-aroused" condition in conjunction with the rather low incidence of significance under the "neutral-neutral" condition is consistent with theoretical predictions. However, the rather low incidence of significance reported for the "aroused-aroused" condition is in direct contradiction to the theoretical structure.

It should be noted, however, that although the evaluative efforts of Klinger provide an interesting and theoretically valuable enhancement to the understanding of the achievement motivation concept, the findings in no way provide conclusive support. Even under conditions providing a high incidence of significance, an impressive amount of non-significant relationships are reported and, therefore, cannot be

ignored. With an apparent need for further investigation in the area of achievement motivation and in line with the discussion presented in the literature review, the present study was initiated. The contribution of the current investigation was to evaluate the differential effects of extrinsic reinforcement and its interactive function with specific levels of achievement motivation inherent in the task performance situation.

Sensory Modality Preference

Introduction to the Sensory Modality Concept

An additional variable receiving a good deal of attention in recent years has been the identification of individual differences in the learner's "perceptual" or "sensory modality" preferences. Bissell, White and Zivin define the sensory modality concept as "a system for interacting with the environment through one of the basic senses" (Lesser, 1971, p. 131). Here the authors suggest that the sensory modality conceptualization involves differences in stimulus input/output based upon sense organs utilized for seeing, hearing, smelling, touching and tasting. Currently in education, emphasis has been placed upon the assessment of sensory modality strengths and weaknesses as an attempt to enhance learning. If the assumption that effective teaching must be based upon the practical recognition of individual differences is valid, then the sensory modality concept provides a potentially dynamic approach to the individualization of instructional methodologies.

Of the variety of sensory pathways available to the learner,

educators have essentially recognized three perceptual channels as extremely important to the learning process: (1) visual, (2) auditory and (3) haptic (tactile/kinesthetic). The basic theoretical approach is based upon the concept that individual preference in modality selection develops through the "selective filtering" of environmental stimulation. It must be noted, however, that sensory modality development and organization appears to be primarily of biological origin. Sinsheimer (1971), for example, suggests that man's neurological organization is such that while two to three million neural fibers are directly responsible for the processing of sensory information, only 350,000 such fibers function to provide sensory-motor output. A primary difference, and a complex one, between man and other primates high on the evolutionary hierarchy is due to the elaboration of structures utilized in the analysis and integration of sensory receptive processes. The overall complexity of the neurological endowment provides for a uniquely human myriad of individual differences.

A primary assumption essential to any discussion of modality preferences in children is that the human mind is a composite system subject to differential rates of development and growth. In accord with this assumption, it is further theorized that the selective filtering process allows the child to be relatively more attentive to stimulation input in one modality than he is to the input of supporting stimulation through other channels. An example provided in the theoretical formulation of Bruner (1968) is supportive of the selective filtering concept. Bruner has described the transitional nature of the process, arguing that the child's earliest (mental) representations of environmental stimulation are provided through "Kinesthetic Thinking"

(motor patterns). In addition, later stages enhance representation of the world through "visual imagery" and finally, through the verbal communication process based on the symbolic representations of language and words. Piaget's (1954; Furth, 1969) theoretical framework of human developmental cognitive abilities provides an additional meaningful provision for the interaction of self with the environment. These interactions are initiated through sensory modality manifestations based upon the complexity of the cognitive structure. Perceptual modality development first develops at the "sensory-motor" level, centering around one's ability to process sensory information at an increasing level of complexity as the child matures to age eight.

Further discussion of the sensory modality concept by Bissell et al. (Lesser, 1974) places the maturation of perceptual processes within an educational context. The authors define developmental modality patterns as following a specific sequence ranging from pre-school (kinesthetic), early elementary (visual) and late elementary (auditory). However, an impressive collection of empirical data allow several authors to suggest that some children appear to possess an optimal sensory modality for learning. While some children learn best through the auditory channel, others learn more effeciently through the visual channel. Several causitive factors for this condition have been provided and include neurological impairment, developmental lag or specific sensory modality preference of the child. For some school-age children showing significant perceptual deficiencies, learning is enhanced through tactile stimulation and by means of kinetically-based internal patterns of awareness.

Based upon a review of clinical records, Freud (1953) reports that

children identified as low in either visual or auditory skills were significantly more prevalent than chance in language or learning deficit groups. In addition, Frosting (1965) asserted that 10 to 25 percent of all children fail to acquire basic reading skills due to the inability of educators to base instructional methods on inherent learner strengths and weaknesses. Theoretically, these results may be justified if the assumption can be made that verbal children typically structure the world in terms of language categories while visual learners appear to excell on tasks requiring recall and categorization on the basis of differential visual cues (visual imagery techniques). Individual differences in sensory modality preference appear to provide for differential effects in the learning activities of some children.

Wepman (1971) states that the differential use of recognized individual differences in modality preference in the subsequent management of instructional strategies is no longer theoretical. Based upon findings gathered from a six-year longitudinal study of 125 children, the author reports the following generalizations:

1. Perceptual processes such as discrimination, recall, improve with age (Developmental).
2. The major modalities of learning, visual and auditory, have differential rates of development.
3. The relation between the individual visual and auditory subtests and intelligence is positive, but very slightly so.
4. It is impossible to predict where a child falls on the visual developmental scale from his placement on the auditory developmental scale, and vice versa.
5. Data from recently completed research clearly establish that

> early perceptual processing ability has a limited but significant predictive value for later school achievement (p. 7).

In light of the above theoretical position, it is evident that a significant potential for the enhancement of children's learning exists through the identification of individual preferences in sensory modality abilities. The remaining literature review will specifically detail early attempts at the identification of differential learning styles based upon sensory modality preferences. In addition, empirical evidence related to the utilization of the sensory modality concept in instructional system development will be advanced.

Empirical Evidence Relating the Sensory Modality Concept to Instruction

Although it would be inappropriate to supply a comprehensive review of the experimental literature dealing with sensory modalities and their relation to specific instructional strategies, a limited discussion of several "typical" articles addressing the problem appears relevant. Since learning to read is perhaps the most essential ability achieved in the primary school years, studies reviewed will be limited to reading acquisition skills. In addition, it should be noted that although most methods of instruction fail to utilize one modality exclusively, many materials do emphasize a single modality channel over another in the reinforcement of specific skills.

An additional point related to the sensory modality concept and instruction is presented by Morency (1968). Research conducted by the author demonstrated that children tend to overcome deficiencies in

modality development by the time they are nine years of age. The research suggests, however, that a small sample of specific cases of children experiencing significant modal deficits beyond this age limit have been evidenced. The overall equalization of sensory modal preferences in children upon entry into the fourth grade appears to be a consistent phenomena. However, at this stage in the educational process, it is likely that a maturational lag reduction in sensory modality deficiencies will not significantly reduce the child's learning difficulties. Both emotional involvement and deficits in academic achievement may contribute to continued school failure. These considerations provide sufficient theoretical and empirical rationale for further investigation of the sensory modality concept. The research evidence to follow has attempted to approach such considerations.

Early studies in the area of sensory modalities were important in the initial identification of individual differences in sensory input channels. More recent efforts, however, have attempted to employ and enhance these classification procedures to maximize student learning in the core curriculum. Bateman (1968) provides an early example in a study designed to measure the overall effectiveness of visual and auditory approaches to instruction in reading. One hundred and eighty kindergarten children systematically divided into eight instructional classes were administered the Metropolitan Reading Readiness Test and the Detroit Group Intelligence Scale as an initial screening process. In addition, the Illinois Test of Psycholinguistic Abilities was administered to four of the instructional groups to provide additional information concerning the children's preferences in sensory modality. These children were subsequently separated into visual and auditory

preference groups based upon test results. The Scott-Foresman Basal Series was used with the visual strength group while the Lippencott Basal Reading Program was administered to auditory strength learners. Auditory strength was determined by Auditory Sequential Memory scores that exceeded Visual Memory scores by nine or more months. Those children scoring less than a nine-month discrepancy between the auditory and visual subtest scores were placed in the visual preference group.

In accord with the findings, Bateman reported that those children classified as auditory learners were significantly superior to visual learners regardless of characteristics of the instructional method. More recent research conducted by Waugh (1973) provides additional support for the overall superior abilities of auditory learners. Most importantly, no significant interaction between modal preference and instructional reading program was advanced. Based upon these results, support for the practice of matching sensory modality preferences to specific instructional programs is not indicated.

It must be conceded, however, that the results set forth in the Bateman study may be of questionable validity based upon several methodological difficulties in design and treatment. A major weakness must include the selection criteria used to assign modal preference. These measures were highly inadequate. In addition, the sample employed in the study was quite homogeneous in nature, the mean I.Q. falling within the superior range of functioning. Generalization of the results beyond this population is a limiting factor.

In a more recent study by Ringler, Smith and Culliman (1971), the learning preferences for 128 first grade children were identified through administration of the New York University Modality Test.

Specific experimental groups included thirty-three children identified as exhibiting a visual preference, thirty children an auditory preference, twenty-eight children a kinesthetic preference and thirty-seven children fell within the no preference range.

All subjects were randomly assigned within each modality grouping to one of four treatment conditions or an experimental control group. The specific treatment conditions consisted of differential instructional strategies of fifty vocabulary words identified as part of the children's expressive vocabulary. The treatment conditions included visual, auditory, kinesthetic, combination and control (no instruction) presentations of the fifty words. Assessment of treatment effectiveness was accomplished through implementation of a criterion-referenced test battery including the fifty initial vocabulary words and 150 additional words as distractors. Both pre-test and post-test measures of word recognition were employed.

Analysis of the data revealed significant differences between each of the treatment conditions and the control group. In addition, no significant main effects were reported between any of the treatment conditions. Likewise, no significant interaction effects were found between modality preference and method of instruction. In basic support of the findings generated by Bateman (1968), children taught via their preferred learning modality failed to experience significant gains over those children receiving instruction not in correspondence to identified preferences. Several other theorists have also reported similar distinctions (Harris, 1965; Smith, 1971; Robinson, 1972; Gellistel, 1972).

Inconsistent with results previously reported, Daniel and Tacker

(1974) provide fairly recent evidence in favor of the sensory modality concept which suggests the matching of instructional strategies with sensory modality preference. The authors employed CVC trigrams as a criterion for successful learning. Subjects participating in the research were selected from 105 elementary school children ranging in age from 7.5 to 8.5 years. Specific criteria for inclusion in the experimental group required an I.Q. score of 90 as measured by the Cattell Culture Fair Intelligence Test and the Peabody picture vocabulary test. In addition, participants were also required to be within normal limits in audition and visual acuity.

Eighty children reached criteria and were subsequently administered the Auditory Reception, Auditory Sequential Memory, Visual Reception and Visual Sequential Memory subtests of the Illinois Test of Psycholinguistic Abilities. Those subjects demonstrating a discrepancy of one year between their overall auditory and visual abilities were placed in the preference group based upon their superior scores. Those subjects not reaching the one-year discrepancy criteria were classified as the no-preference group.

The CVC trigrams drawn from the Glaze and Krueger Scales were administered through three trials, with three-day intervals between trials. Each specific trial consisted of two presentations, one the list favoring auditory skills, one the list favoring auditory skills, the other favoring visual preferences. All children received both lists on each of the trial days.

In examining the findings, it appears that clear support is indicated for the use of instructional materials based upon the sensory modality preferences of the learner. A significant interaction was

found, indicating that the three groups learned differently under the two methods of stimulus presentation. Specifically, the auditory preference group recalled a significantly greater number of trigrams under the auditory presentation method than under the visual presentation method. Conversely, those subjects placed in the visual preference group recalled significantly more when the trigrams were administered in the visual rather than the auditory mode. No significant differences in modes of presentation were evidenced for the no-preference group. In line with these findings, additional support for the sensory modality preference x method of instruction interaction was advanced by Bursuk (1971).

Primarily based upon the rather inconsistent experimental evidence reported in the sensory modality literature and as a further effort to integrate the sensory modality construct with other concerns in the present investigation, a summative comment first provided by Wepman (1964) appears relevant. Wepman urges that the value of reinforcement lies only in its ability to actually reinforce instructional materials presented to the learner. However, when extrinsic reinforcement established through several modality channels confuses or necessitates the expenditure of excessive amounts of time, it will likely contribute a negative aspect to the learning process. This relationship may provide an important link between concern over the effectiveness of extrinsic reinforcement and the overall perceptual modality preference of the child. The interactive function of these variables and their effect on the educational process requires further consideration.

CHAPTER III

DESIGN, METHODOLOGY AND PROCEDURAL FORMAT

Introduction

The literature review developed in the preceding chapter has established an empirical base concerning the study of extrinsic reinforcement. In addition, support for the inclusion of the theoretical constructs of achievement motivation and sensory modality preference was advanced. In the present chapter, a description of the experimental design and research methodology is set forth. Specifically included is a discussion of the sample and population, independent variables, dependent variable, experimental design, materials and apparatus and experimental procedures.

Sample and Population

Subjects participating in the investigation were drawn from the total population of 119 kindergarten children attending public school classes in a semi-rural community in North Central Oklahoma. The experiment was conducted during the spring semester of the 1975-76 academic year. The overall sample size consisted of 90 children ranging in age from five to six years old.

Population characteristics of the community are described as being predominantly White and middle class, with an economic base consisting

of light industry, agricultural and service-oriented businesses. The 1970 census established a total population at 8,700 with 94 percent of the residents being of Caucasion origin and 6 percent primarily of American Indian and Mexican-American decent.

The local public school district provides educational services to approximately 1,870 students. The kindergarten population of 119 children attends half-day classes in either a morning or afternoon session. Three kindergarten teachers primarily provide a teacher-directed, academically-oriented program for all children. For the most part, the curriculum emphasizes arithmetic concepts, reading readiness and language development skills. All kindergarten classes are housed in the curriculum center for the local school district.

Eligibility for participation in the kindergarten program is established by the criterion that children reach their fifth birthday prior to November 1-st of the current school year. Although classroom size averages 22 students for the regular kindergarten program, a special class involving 8-10 children has been established in an effort to deal with a variety of emotional and academically-oriented problems experienced by these students. This special class was not included in the sampling procedures.

Independent Variables

Extrinsic Reinforcement

In accord with a major concern of the study, extrinsic reinforcement was employed as an independent stimulus variable. A further description of the stimulus variable establishes extrinsic reinforcement

under direct experimental control and manipulation. Three fixed levels of extrinsic reinforcement were employed: Verbal Reinforcement, Concrete (Material) Reinforcement and a Combination Verbal-Concrete Reinforcement condition.

Achievement Motivation

A second independent variable, Level of Achievement Motivation, was also evaluated, functioning in a manner characteristic of an organismic or mediating variable. Operationally defined along the lines of the Atkinson-Feather (1966) conceptualization, achievement motivation was considered an extremely complex psychological variable influenced by developmental and school-related experiences. Two fixed levels of achievement motivation, "high" and "low," were incorporated into the experimental design. A median break procedure was employed to establish the specific levels.

Sensory Modality

The evaluation and classification of subjects based upon Sensory Modality Preferences was implemented as a third and final independent-organismic variable for current investigative purposes. Fixed levels of sensory modality preferences were established and included Visual Preference, Auditory Preference and No-Preference groupings. It must be stated, however, that inclusion of the sensory modality construct was intended as primarily exploratory in nature. Caution in the evaluation of the main and interactive effects of the organismic variable was necessitated based upon the anticipation of a relatively small number of subjects meeting the theoretical criteria for sensory

modality preference classification. Specific recommendations toward further investigation utilizing a significantly larger sample were dependent upon experimental findings.

Dependent Variable

For purposes of the present investigation, the dependent variable was operationally defined as the total sum of correct visual discriminations on a three-choice discrimination learning task.

Experimental Design

In consideration of the primary hypotheses under investigation, a 3 × 2 × 3 fixed model factorial design was employed to facilitate the statistical analysis of the data. Specifically, the first factor represented the three levels of extrinsic motivation, factor two represented the two levels of achievement motivation and the third factor represented the sensory modality preference of the subject.

Confidence intervals were established at 0.05 and 0.01 in efforts to test the various hypotheses set forth. A majority of the statistical computations were performed at the Oklahoma State University Computer Center.

Materials and Apparatus

To accomplish the evaluation of subjects based upon the experimental treatment condition (independent-stimulus variable), a semi-manually operated multi-media slide and tape recorder presentation of the learning task and subsequent extrinsic reinforcement condition was initiated. This particular approach was developed to insure a maximum

level of extraneous variance control in the administration of the treatment conditions for each subject.

A Kodak Ektagraphic AF-2 Slide Projector was used to present the three-choice visual discrimination learning task. A total of 60 slides containing the three-line drawings of familiar objects was developed and processed for use in the slide presentation. A Caritel Rear Projection Screen (Hudson Photographic Industrial, Serial Number 621) was used to facilitate the slide display. The rear projection screen has an overall length and width of 15 inches and 14 inches, respectively. The screen is suitable for desk-top viewing.

To administer the positive and negative statements representative of the verbal reinforcement condition, two Wallensack 2520 Cassette Tape Recorders equipped with a continuous loop tape system and external speaker were utilized. The procedure, providing maximized control of extraneous variance inherent in most verbal reinforcement techniques, was established across subjects. Elimination of subtle differences in tonal quality, inflection, facial expression and gesture was attempted through the procedure.

The presentation of an "m&m" candy under the concrete reward condition was facilitated through the use of a transparent plastic tube leading to a plastic container in full view of the child. The distribution of the concrete reward was accomplished manually. Control was again maintained through the initiation of reward presentations from a position behind the subject.

In the combination verbal-concrete reward condition, an integration of both verbal reinforcement and concrete reward administration apparatus was utilized. In addition, a manually-operated hand counter

was used to record all correct responses.

Procedures

The overall purpose of the study was based upon two primary objectives. First, a comparison of the differential effects of Verbal, Concrete and Combination Verbal-Concrete Extrinsic Reinforcement on discrimination learning in the kindergarten environment was evaluated. Secondly, the main and interactive function of Extrinsic Reinforcement, Achievement Motivation (High-Low) and Sensory Modality (Visual, Auditory, No-Preference) was established in an effort to consider the effect of a unique combination of individual differences on reinforcement effectiveness and discrimination learning.

It is useful to present procedural considerations as a function of three specific phases of implementation. In sequential order, Phase I will deal exclusively with the assessment of achievement motivation; Phase II, Sensory Modality; and Phase III, the experimental treatment condition of extrinsic reinforcement and measures on the criterion variable.[1] Specific procedures for each phase of the research will be discussed in terms of organizational format, personnel involvement, assessment procedures and duration.

Phase I, the assessment and classification of achievement motivation levels, involved the evaluation of all subjects in terms of their performance on Animal Crackers: A Test of Motivation to Achieve (Atkins and Ballif, 1975). Test administration was accomplished in

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[1]Appendix A provides a detailed description of assessment instrumentation employed in the investigation.

small groups of approximately 10-12 children. The Experimenter administered all assessment instruments. Two teacher aids were available as proctors to assist in the test administration procedures. Each testing session was conducted in the kindergarten classroom and lasted approximately 45 minutes. The levels on the achievement motivation factor (high-low) was established by the median break procedure.[2] The duration of Phase I procedures was approximately one week.

Phase II, providing assessment and identification of all subjects as either visual, auditory or no-preference learners, was accomplished in a two-week period. The Kindergarten Screening Test (KST), assembled from a variety of standardized group and individual achievement and aptitude tests by Young (1975) and Treadway (1975) was used to establish modal preference. Those children whose visual preference scores exceeded auditory preference scores by 0.50 standard deviations based upon z-score conversions were classified as "visual learners." Conversely, subjects showing a visual-auditory discrepancy of 0.50 standard deviations in favor of the auditory modality were classified as "auditory learners." All other subjects showing a visual-auditory score discrepancy less than 0.50 standard deviations were placed in the "no-preference" group.[3]

The KST necessitated both individual and group administration. Individual testing was accomplished in quiet, isolated rooms near the kindergarten classes. In addition, group administration of specific

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[2]Appendix B, Table VI, provides a hierarchical distribution of achievement motivation scores.

[3]Appendix B, Table VII, displays a summary and rank order of overall standard score visual-auditory discrepancy.

subtests were undertaken in the regular classroom. The researcher, reading specialist and classroom teacher personnel supplied the essential clinical expertise necessary to insure accurate data collection.

For Phase III of the study, specific procedural operations will be addressed in relation to the experimental treatment conditions investigated. In the verbal reinforcement condition, the Experimenter systematically presented the appropriate reinforcement through a tape recording system. Tape recorded verbal statements to the effect of "Very Good, That's Right" or "No, That's Wrong" were activated based upon correct or incorrect responses, respectively. Selection of the specific verbal reinforcement combination was based upon rather consistent experimental evidence of its superiority over all other forms of verbal reinforcement combinations (Buss and Buss, 1957; Meyer and Seidman, 1960; Spence and Dunton, 1967).

For the concrete reward treatment condition, the Experimenter manually dispensed one piece of "m&m" candy immediately after correct responses only. This was accomplished by inserting the candy reward into a transparent plastic tube, resulting in its accumulation in a dish container. The child was instructed not to sample the candy during the testing session, but that upon completion of the task, all candy earned was his to keep. No concrete reward or other reinforcement procedure was administered after incorrect visual discriminations.

Under the combination verbal-concrete reinforcement condition employed to evaluate the Distractibility Hypothesis, all children received reinforcement as specified in both the verbal reinforcement condition and concrete reinforcement procedures. Activation of the

tape recorded positive verbal statement and the dispensing of an "m&m" candy was maintained for each correct response that the child made. Presentation of the negative verbal statement was provided for incorrect subject responses. In addition, all reinforcement procedures were administered when appropriate immediately following the subject's response for each of the three experimental treatment conditions.

In consideration of the general research procedures the following discussion is relevant. Subjects were randomly assigned to one of the three experimental treatment conditions (n = 30). Each subject received either verbal, concrete or combination verbal-concrete reinforcement. Other than treatment condition differences inherent in the experimental manipulation, all subjects received identical procedural instructions and interacted with the same discrimination learning task.

The Experimenter tested all subjects individually in a quiet room away from the distractions of the kindergarten classes. Each subject was seated at a small table on which the rear projection screen was assembled. Subject responses were facilitated by touching the screen upon which the three-choice task was projected. Under these arrangements, all stimuli were clearly visible and responses easily obtained. In order to control any potential extraneous Experimenter-Subject interactions, the Experimenter was seated directly behind the subject and was able to effectively operate the apparatus from this position.

Before the initiation of testing, each subject was introduced to the twelve line drawings individually reproduced on 8 1/2 by 11 inch white paper. This procedure was followed to insure that familiarization with the line drawings was established. Under these procedures, the subject was required to supply the name of each line drawing. If

incorrect responses were given, the subject was provided with the correct name. The procedure was continued until mastery was accomplished.

Verbal instructions immediately preceding the task were presented as follows:

> Today you are going to see some pictures on the screen in front of you. Pay close attention to the pictures because we're going to play a game with them. In the game, one of the pictures wins and the other two pictures lose (the E points to the first set of line drawings). Point to the picture that you think wins. You may have to guess at first. Also, in this game there are a total of four winning pictures altogether. Don't forget, the game is to try to remember all the winning pictures. Do you know what to do?

Instructions based upon the particular type of treatment condition employed were appropriately administered as follows:

> When you hear "Good, That's Right!" (and/or when a piece of candy falls into the dish), you will know that you chose one of the four winning pictures. If you hear "No, That's Wrong!" (and/or a piece of candy does not fall into the dish), you will know that you did not choose the winning picture. Remember this because you will see the winning and losing pictures again.

The line drawings designated as "winning pictures" were randomly selected prior to the testing session and remained identical for all subjects across all trials. One set of stimuli (slide presentation) at a time was presented to each child. Following the subject's response for each set of line drawings, the experimenter immediately presented the appropriate extrinsic reinforcement based upon the specific experimental treatment condition. Consequently, the slide projector was activated flashing the next set of line drawings on the screen. The procedure was continued throughout the task until either 60 responses were obtained or criterion was reached. Criterion for the visual

discrimination task was operationally defined as eight successive errorless responses. A cumulative total of correct responses was recorded for each subject on a manually-operated hand counter. In the event that criterion was established before the actual completion of the 60 response frames, those sets of stimuli to which the child was not exposed were recorded as correct responses. The duration of Phase III was approximately two weeks in length.

CHAPTER IV

STATISTICAL RESULTS

Introduction

The major purpose of the investigation was to evaluate the main and interactive function of extrinsic reinforcement, achievement motivation and sensory modality preference based upon performance on a three-choice visual discrimination learning task. This chapter provides a detailed description of the statistical analysis of the data, an evaluation of the results and the degree to which the several null hypotheses under investigation were supported.

Statistical Analysis of the Data

Based upon the conditions set forth in the experimental design, the data were analyzed by techniques involving a 3 × 2 × 3 completely randomized analysis of variance using an unweighted means method (Kirk, 1968). This method was essentially employed due to the problem of an unequal distribution of data throughout the cells. The experimentally manipulated stimulus independent variable under evaluation consisted of three levels of extrinsic reinforcement [extrinsic reinforcement-verbal (ER-V), extrinsic reinforcement-concrete (ER-C), and extrinsic reinforcement-combination verbal and concrete (ER-VC)]. In addition, the organismic independent variables consisted of two levels of

achievement motivation [high achievement motivation (AM-H) and low achievement motivation (AM-L)] and three levels of sensory modality preference [sensory modality preference-auditory (SMP-A), sensory modality preference-no preference (SMP-NP) and sensory modality preference-visual (SMP-V)]. The dependent variable, visual discrimination learning, was operationally defined as the total number of correct three-choice visual discriminations based upon the presentation of sixty slides of line drawings, three drawings per slide. The results of the analysis of variance using the unweighted means method are reported in Table I. An analysis of the results based upon the specific null hypotheses under consideration are presented below:

1. There is no significant difference in visual discrimination task performance of kindergarten children under various extrinsic reinforcement conditions.

The hypothesis in question predicted no differential main effect based upon type of extrinsic reinforcement condition. However, in consideration of the analysis provided by Table II, support for the rejection of the null hypothesis was indicated ($\underline{F} = 5.31$, $\underline{df} = 2/72$, $\underline{p} < 0.01$). The table of means and standard deviations (Table III) provide further evidence of a significant discrepancy between the verbal, concrete and combination verbal-concrete extrinsic reinforcement conditions at least at some levels. However, a further analysis of the effects of the extrinsic reinforcement condition will be withheld based upon the analysis of its interaction with sensory modality preference evaluated under hypothesis 6.

2. There is no significant difference in visual discrimination task performance of kindergarten children under two levels of

TABLE II

SUMMARY OF THE ANALYSIS OF VARIANCE USING METHOD OF UNWEIGHTED MEANS ON NUMBER OF CORRECT VISUAL DISCRIMINATIONS

Source	Degrees of Freedom	Mean Square	F
Extrinsic Reinforcement Condition	2	142.83	5.31**
Level of Achievement Motivation	1	12.72	.47
Sensory Modality Preference	2	8.25	.31
Extrinsic Reinforcement Condition × Level of Achievement Motivation	2	14.49	.54
Extrinsic Reinforcement Condition × Sensory Modality Preference	4	72.92	2.71*
Level of Achievement Motivation × Sensory Modality Preference	2	5.58	.21
Extrinsic Reinforcement Condition × Level of Achievement Motivation × Sensory Modality Preference	4	26.96	1.00
Error (W. cell)	72	26.90	-

*P < 0.05.
**P < 0.01.

TABLE III

THE MEANS, STANDARD DEVIATIONS AND SAMPLE SIZE FOR LEVELS OF THE EXTRINSIC REINFORCEMENT CONDITION

Level of Extrinsic Reinforcement	N	Mean	SD
(ER-V)	30	43.7333	10.2248
(ER-C)	30	34.3000	9.0586
(ER-VC)	30	42.4667	11.7788

achievement motivation.

Retention of this null hypothesis was supported as the level of achievement motivation, high-low, used to predict subsequent task performance was found to be non-significant ($F = 0.47$, $df = 1/72$, $p > 0.05$).

3. There is no significant difference in visual discrimination task performance of kindergarten children under various levels of sensory modality preference.

This hypothesis predicted no significant main effect for individual differences based upon sensory modality preference, specifically auditory, visual and no-preference. Also indicated in Table II, support for the null hypothesis was found ($F = 0.31$, $df = 2/72$, $p > 0.05$).

4. There is no significant global interaction between extrinsic reinforcement, achievement motivation and sensory modality preference in predicting visual discrimination task performance in kindergarten children.

This hypothesis predicted no interaction effect based upon the identification of individual differences in the form of level of achievement motivation, sensory modality preference and as a result of random assignment to extrinsic reinforcement condition. As indicated in Table II, rejection of this null hypothesis was not supported ($F = 1.00$, $df = 4/72$, $p > 0.05$).

5. Level of achievement motivation will not significantly interact with extrinsic reinforcement conditions in predicting visual discrimination task performance in kindergarten children.

Evaluation of Table II provided support for this null hypothesis as the level of achievement motivation by extrinsic reinforcement condition interaction was found not significant ($F = 0.54$, $df = 2/72$, $p > 0.05$).

6. Sensory modality preferences will not significantly interact with extrinsic reinforcement conditions in predicting visual discrimination task performance in kindergarten children.

This hypothesis predicted no significant interaction effect between sensory modality preference and extrinsic reinforcement conditions. As indicated in Table II, the null hypothesis was not supported ($F = 2.71$, $df = 4/72$, $p < 0.01$). Further evaluation of hypothesis 6 due to the significant interaction provided an analysis of the simple main effects as indicated in Table IV. These results provide evidence of significant differences between extrinsic reinforcement conditions at all levels of sensory modality preference (SMP-A, SMP-NP and SMP-V). Following procedures outlined by Kirk (1968), a subsequent comparison of means was established through the utilization of the Tukey ratio technique. A somewhat modified procedure in the calculation of Tukey's ratio was necessitated due to an uneven distribution of data used to calculate specific cell means. An analysis of these results represented in Table V as well as in Figure 1 indicates a significant differential reinforcement effect at each level of sensory modality preference.

Specifically, under both the SMP-A and SMP-NP condition, both the ER-V and the ER-VC groups performed at a significantly superior level on the visual discrimination task in comparison to the ER-C group. Also, no significant difference between the ER-V and the ER-VC task performance was established. However, a comparison of means at the

TABLE IV

SUMMARY OF SIMPLE MAIN EFFECTS ANALYSIS FOR EXTRINSIC REINFORCEMENT CONDITION BY SENSORY MODALITY PREFERENCE

Source	Degrees of Freedom	Mean Square	F
Extrinsic Reinforcement Condition	2	142.83	5.31
Between Extrinsic Reinforcement Conditions			
at (SMP-A)	2	260.15	4.78*
at (SMP-NP)	2	453.32	4.30*
at (SMP-V)	2	534.86	3.93*
Sensory Modality Preference	2	8.25	.31
Between Sensory Modality Preference			
at (ER-V)	2	199.49	2.05
at (ER-C)	2	30.71	.36
at (ER-VC)	2	320.44	2.56
Extrinsic Reinforcement Condition × Modality Preference	4	72.92	2.71
W. Cell (Error)	72	26.90	

*$P < 0.05$.

TABLE V

TUKEY'S COMPARISON OF CORRECT VISUAL DISCRIMINATION MEANS FOR EXTRINSIC REINFORCEMENT CONDITIONS AT ALL LEVELS OF SENSORY MODALITY PREFERENCE

		Extrinsic Reinforcement Conditions		
		ER-V	ER-C	ER-VC
Level of Sensory Modality Preference	SMP-A	42.67a	35.86b	48.50a
	SMP-NP	41.41a	33.07b	43.47a
	SMP-V	50.28a	36.00b	34.86b

Note: Means represented by different letter subscripts for each level of sensory modality preference differ from each other at the 0.05 level.

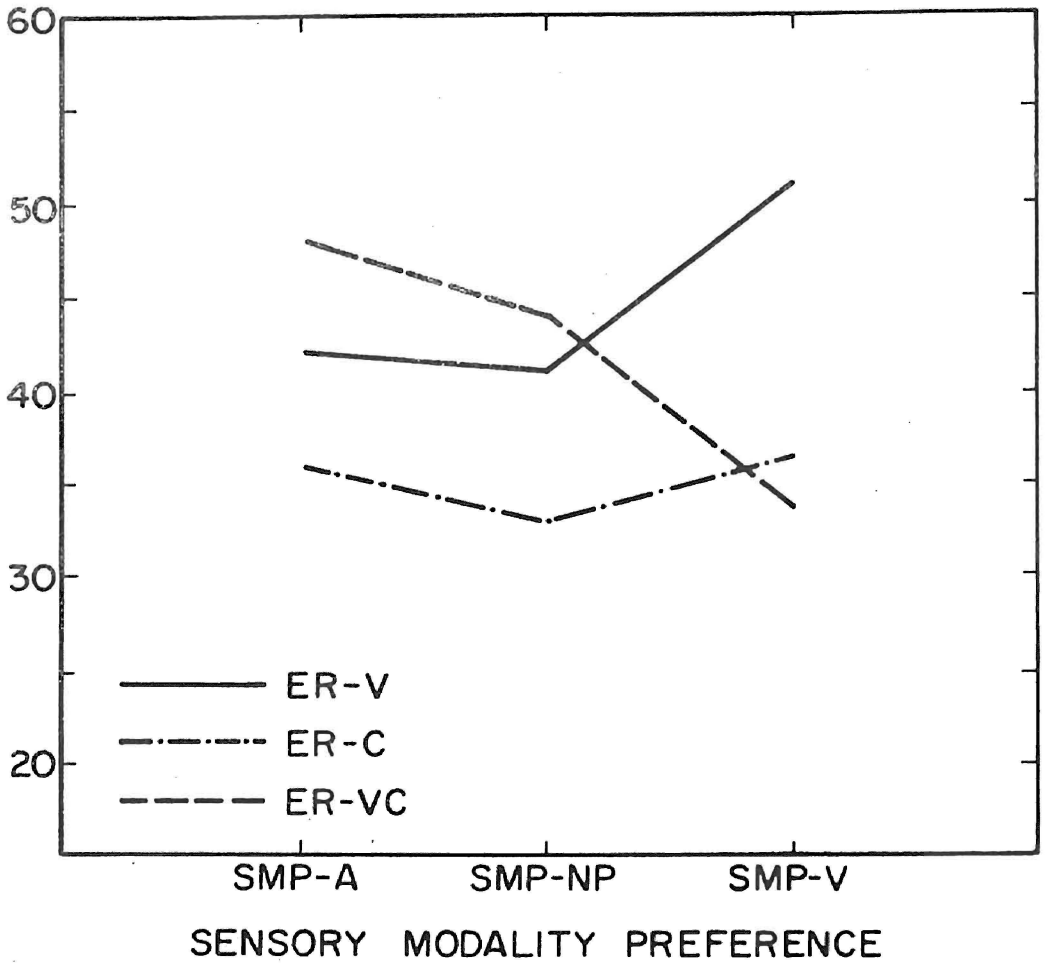

Figure 1. Mean Number of Correct Visual Discriminations as a Function of Extrinstic Reinforcement Condition and Sensory Modality Preference

SMP-V level indicated results of a different nature, establishing a specific analysis of the interaction effect. Under the SMP-V condition, the ER-V group showed significantly superior performance in the visual discrimination task in comparison to the ER-C and ER-VC groups. In addition, it can also be seen from Table V and Figure 1 that there was no significant difference between the ER-C and ER-VC groups at these levels of significance.

Continuing with the evaluation of hypothesis 5, Table IV indicates that there was no significant difference between sensory modality preferences at the ER-V, ER-C and ER-VC levels of extrinsic reinforcement. This result indicated consistent task performance for each extrinsic reinforcement condition regardless of individual differences in sensory modality preferences identified within each group.

7. Level of achievement motivation will not significantly interact with sensory modality preferences in predicting visual discrimination task performance in kindergarten children.

As indicated in Table II, support for this null hypothesis was found ($\underline{F} = 0.21$, $\underline{df} = 2$, $\underline{p} > 0.05$).

CHAPTER V

DISCUSSION, IMPLICATIONS AND RECOMMENDATIONS

Introduction

The overall purpose of the present investigation was to evaluate the differential effects and interactive function of extrinsic reinforcement and two organismic variables on visual discrimination in kindergarten children. The extrinsic reinforcement effort was primarily an extension of the theoretical and empirical work conducted by Spence (1966), Spence and Dunton (1967), Ferrell (1968) and Spence (1970). In addition, the introduction of the two organismic variables in an attempt to provide a unique and meaningful reconceptualization of the extrinsic reinforcement issue was established. These variables included a theoretical model of achievement motivation in line with the Atkinson (1957, 1958), Atkinson and Feather (1966) framework in addition to the sensory modality concept supported by Wepman (1964), Wepman and Morency (1971). Hypotheses of concern were developed in null form based upon the main and interactive effects of the variables under consideration. The present chapter is divided into three major sections. Initially, a discussion of the findings will be provided. Section two will attempt to draw implications relevant to educational practice while section three will set forth recommendations for further investigation.

Discussion of the Findings

Based upon the major purpose of the investigation, the analysis of the data supports the determination of a significant main effect for the independent stimulus variable, namely extrinsic reinforcement. In addition, a significant interaction effect evidenced between extrinsic reinforcement and sensory modality preference appears to be the most significant derivative of the research effort. The discussion of experimental findings devotes much attention to this issue. However, in view of the retention of a majority of the null hypotheses set forth in Chapter I, it is apparent that further explanation is essential to a clear treatment of the variables. The major function of the discussion section entails an evaluation of the findings through integration of the theoretical issues and empirical evidence.

Past investigators have studied the extrinsic reinforcement phenomenon through the manipulation of a variety of variables. From a review of these research efforts, the safest and most appropriate statement might well include calling upon the utilization of positive reinforcement in the learning environment. Due to a large number of inconsistencies, this rather limited statement may provide educators with little additional guidance for classroom intervention. Teager and Stern (1969) have actually recommended that children can be taught to employ feedback stimuli exclusively as information signals and subsequently transfer their informative value exclusive of incentive to tasks differing in orientation. He observed that none of the effective types of extrinsic reinforcement appeared essential for learning to take place. Although these arguments are likely valid under certain

conditions, generalization of the position is difficult to justify based upon current findings. Most specifically, extrinsic reinforcement in the form of effective incentives may actually promote attending behavior rather than maximize task performance through informative feedback properties.

Evaluation of the null hypothesis directed toward the assessment of differential effects of verbal, concrete and combination verbal-concrete extrinsic reinforcement suggests no significant difference in their overall effectiveness to promote discrimination learning. Judging the fact that this null hypothesis was not retained, support for an ER-V superiority when compared to the ER-C treatment condition must be advanced. Based upon the later analysis of a significant extrinsic reinforcement x sensory modality preference interaction, further evaluation of the main effects of extrinsic reinforcement was not deemed necessary. However, a peripheral view of these results may provide an interesting consideration based upon past empirical evidence. As evidenced in Table II and Table III presented in Chapter IV, it does appear from a review of cell means that along with the inherent differences between the ER-V and ER-C groups, evidence of an additional difference between the ER-VC and ER-C groups is also indicated. These findings appear to be important on several counts and will be developed further.

Previously discussed in Chapter II, early research assessing the differential effects of extrinsic reinforcement has provided inconsistent findings at best (e.g., Terrell and Kennedy, 1957; Unikel, Strain and Adams, 1970). These difficulties eventually necessitated a reconceptualization of the extrinsic reinforcement issue through employment

of a variety of additional independent variables.

It is important to note that the results of this study appear to support, at least at a surface level, the findings reported by Spence (1966), Ferrell (1968) and Litwin (1974). Generally, these studies provide substantial support for a verbal reinforcement superiority, regardless of socioeconomic level.

Based upon these findings, researchers extended efforts toward a determination of the causitive factors responsible for the verbal reinforcement superiority. Several explanations appear appropriate. One possible explanation was advanced suggesting an inherent reduction of the chain of mediating responses for verbal reinforcement administration. Under this condition, it may be unnecessary for the learner to conceptualize that a non-verbal symbolic representation was indicative of a correct response. Other discussion can be generated from Thorndike's (1936) early arguments which proposed a scatter of influence leading to satiation during the administration of concrete incentives on an intermittant schedule. One final explanation of the verbal reinforcement superiority receiving moderate support was based upon the Distractibility Hypothesis (Spence, 1970). The author advanced the position that concrete rewards immediately administered after a correct response tended to significantly distract the child's attending behavior from the demands of the task situation. In line with the findings reported in Chapter IV, it now appears that past attempts to test the Distractibility Hypothesis through analysis of verbal and combined verbal-concrete reinforcement differences have been generally appropriate but rather limited in scope.

To summarize the discussion to this point, it appears that the

noted ER-V superiority in conjunction with the apparent lack of support for the Distractibility Hypothesis provides support for the work presented by Farber (1971) and Blair (1972). However, the addition of sensory modality to the extrinsic reinforcement line of study may provide sufficient justification for the revitalization of the extrinsic reinforcement issue.

Evaluation of the hypotheses presented in Chapter I investigating the extrinsic reinforcement x sensory modality preference interaction predicts no significant interaction effect. Rejection of this null hypothesis allows one to recommend the existence of a unique relationship between the extrinsic reinforcement and sensory modality preference variables. Specifically, Table IV and Table V presented in Chapter IV provide the necessary evidence for a reconceptualization of the extrinsic reinforcement issue with regard to the Distractibility Hypothesis. Analysis of the data indicates clear support for previous research conducted by Spence (1966), Spence and Segner (1967), Ferrell (1968) and Litwin (1974) with respect to an ER-V superiority over the ER-C condition at all levels of sensory modality preference. In addition, the SMP-A and SMP-NP levels of sensory modality preference clearly provide additional support suggesting no significant distractibility based upon the administration of concrete reward. However, an extremely important extrinsic reinforcement x sensory modality preference interaction is evidenced through comparison of cell means under the SMP-V condition at the ER-C and ER-VC levels of extrinsic reinforcement. Under these conditions, results continue to indicate a significantly superior ER-V effect. Most importantly, however, the failure to obtain a calculated significant difference between the ER-C

and ER-VC groups in conjunction with the significant ER-V superiority provides support for the Distractibility Hypothesis as advanced by Spence (1970), Teager and Stern (1969) and Marshall (1969). Children evaluated as falling within the visual sensory modality group and thereby considered "visual learners" were significantly distracted in their task performance by the presentation of the "m&m" concrete reward. These findings gain added importance based upon the position that visual learners tend to enhance their learning potential through the decoding and internal processing of visual stimulation provided by the curricular materials and instructional design. The lack of distractibility of the concrete reward evaluated by the ER-V/ER-VC comparison for both "auditory learners" and those children demonstrating no preferred learning modality establishes the identification of specific individual differences in task performance based upon sensory modality preference and extrinsic reinforcement. As Wepman (1964) argues, the inherent value of extrinsic reinforcement is evidenced only in its capacity to actually reinforce the instructional program presented to the learner. The administration of extrinsic reinforcement may provide a negative aspect of the instructional system if it carries with it confusing properties or a demand for excessive amounts of time. The present investigation clearly establishes support for this line of reasoning when visual learners are provided concrete rewards. In addition, the relationship has established an important connection between extrinsic reinforcement effectiveness and the overall perceptual modality preference of the child. Based upon the discussion, it may be concluded that the Distractibility Hypothesis does appear to be valid under certain conditions where the child's preferred learning modality is visual

in nature.

An additional major hypothesis of concern addressed itself to the differential effects of level of achievement motivation (high versus low) on subsequent task performance. Although the null hypothesis was not rejected, further evaluation of the concept appears warranted. Based upon past evidence, the theoretical relationship between achievement motivation and task performance predicted increased success for those high in achievement striving. Although the investigation did not specifically test the achievement motivation theoretical framework, evaluative efforts were provided to assess the gross utility of the theoretical construct to predict task performance. Failure to support the relationship may reasonably be assumed to be the contribution of extraneous factors.

Results may possibly be the responsibility of a variety of externally based situational factors (T_{ext}) entering into the experimental setting. These situational factors may provide a significant level of influence in the arousal of achievement-oriented behavior. For example, Douvan (1956) reported that her working-class subjects were found to rely heavily upon situational factors, specifically extrinsic incentives. Support for this contention is also drawn from Horner (Berlyne, et al., 1971) who argues that those individuals classified as low in intrinsic motivation toward achievement will perform at a level equal to those high in achievement motivation when appropriate extrinsic incentives are provided.

Past theoretical efforts provided by Smith (1969) and Baron (1966) linking one's developmental history of reinforcement to subsequent task performance, achievement striving and preference for external incentives

are not substantiated by the findings. Although it is likely that each individual does establish a personal extrinsic reinforcement baseline based upon social history antecedents, specific psychosituational characteristics may possibly reduce the overall influence of these factors. In addition to the recognized contribution of extrinsic incentives, it is possible that specific demand characteristics arranged and manipulated by the Experimenter may have actually cohersed the Subjects low in achievement motivation to attend to the task situation, thereby increasing performance. This implication is especially interesting in light of the contrasting group administration to assess level of achievement motivation for present research purposes.

Maehr and Sjogren (1971) present the argument that the internal motivational tendencies toward task performance, namely M_s and M_{af}, are an integral part of the one's enduring orientation and that this predilection will vary between individuals. However, it does appear that the internal characteristics are much more transient than originally assumed, at least for short-term task performance. In accord with this analysis, Klinger's (1966) review presented in Chapter II provides a similar distinction between task-specific and molar performance measurements in relation to the achievement motivation-performance prediction. The author provides evidence to suggest that the achievement motivation-performance relationship appears markedly subject to situational determinants when evaluated through task-specific measurements. On the other hand, molar measurements of the relationship promise a relatively stable indication of the effect of achievement motivation on long-term achievement-oriented activity.

Based upon the findings, it does appear that utilization of the achievement motivation concept within the academic setting may not enhance one's ability to predict specific task performance on a day-to-day basis. Most importantly, it may be argued that in any given situation, any child may demonstrate observable achievement striving behavior based upon the administration of individually appropriate incentives.

Throughout the manuscript, one overriding philosophical position has been advanced. Specifically stated, this position recommends that if effective, productive instruction is to be realized, the practical recognition of individual differences of the learner must be validly assessed and utilized. In reviewing the sensory modality literature in Chapter II, it was realized that current attempts to match sensory modality preference to complimentary systems of instruction have met with only limited success. Although the research effort was not specifically designed to assess this issue, the main effects hypothesis concerning sensory modality preference appears to have added little to a reconciliation of the inconsistencies found in the literature. Current findings support the null hypothesis of no significant main effects for SMP-V, SMP-A and SMP-NP groups based upon visual discrimination learning performance. This result is in agreement with the research efforts reported by Ringler, Smith and Culliman (1971). Differential levels of task performance were not indicated based upon the identification of auditory, visual and no preference learner characteristics. The fact that the task itself was highly oriented toward the visual presentation of stimuli and, therefore, subject to bias favoring the visual learner appears to have had little effect on

the outcome. In explanation, it is likely that these findings were due to specific task requirements demanding rather gross forms of visual discrimination. Task performance subject to fine visual discriminations may have significantly altered the experimental findings.

The remaining three hypotheses of concern directed their attention to the interaction between extrinsic reinforcement and achievement motivation, achievement motivation and sensory modality preference and the global interaction of all independent variables, concurrently. The statistical treatment of the data set forth in Chapter IV demonstrates no significant differential effects based upon these specific interactions of the extrinsic reinforcement, sensory modality preference and achievement motivation variables. All null hypotheses concerning the interactive function of these variables based upon the stated three comparisons were retained.

Educational Implications

Although generalization of the findings to the academic setting must be considered tentative, several educational implications may provide some direction to the practitioner. It may be argued that the administration of verbal or socially oriented modes of reinforcement will be most effective in the promotion of efficient task performance. However, the present use of concrete incentives in the classroom on a limited basis with some children requires further evaluation of reinforcing agent characteristics. Concrete rewards are employed to increase the child's attention span and interest level of the academic activity. Because their overall effects have been found to dissipate over time, transfer from concrete to verbal reinforcement early in the

instructional or behavioral management program may be required. Furthermore, implimentation of various systems of concrete reward such as the token economy or presentation of candy should not be expected to replace cognitively stimulating curricular materials.

It was found that the Distractibility Hypothesis is likely relevant when the learner's preferred channel of sensory input is visual in nature. Educational implications appear warranted on two counts. Initially, it is suggested that educators establish verbally-based systems of extrinsic reinforcement whenever possible to compliment instructional programs. In addition, concrete rewards should be used sparingly and only when the situation demands. Special care must be taken to insure that the administration of concrete rewards is accomplished in a way that reduces the inherent level of distractibility. These implications are especially meaningful for kindergarten children similar in characteristics to the population under investigation. For visual learners, concrete rewards are likely to provide a negative aspect to the learning situation and consequently should not be administered during the activity. If concrete incentives are deemed necessary, caution should be taken in the determination of the specific nomenclature and schedule of reward presentation.

Educational implications concerning the achievement motivation construct are difficult to assess at this time. From the discussion, it has been argued that additional situationally-specific cues, task characteristics and instructional procedures provide a wide variety of extrinsic incentive conditions contingent upon completion of an academic activity. The individual student is fully aware that his academic performance is continually evaluated through grade reports, special

privileges, tangible rewards or teacher comments and expectations.

The overall utility of the theory of Achievement Motivation in the academic setting must continue to remain highly speculative. To date, the theory has been primarily concerned with highly specialized internal and externally controlled conditions, events often difficult if not impossible to manage in the public school classroom.

The basic question of designing instructional strategies sensitive to individual learner differences has received rigorous attention in this investigation. Apparently, educators need not only consider the characteristics of the stimulus materials inherent in the instructional program, but equal emphasis should be placed on the interactive effects of sensory feedback and strategies of extrinsic reinforcement. Future emphasis on the evaluation of feedback systems in conjunction with the type of reinforcement administered may establish a meaningful analysis of matching instructional strategies to achievement-related learner characteristics.

Recommendations for Further Research

The overall importance in the recognition and utilization of inter- and intra-individual differences to promote academic task performance has been emphasized throughout the manuscript. The major implication of this study is derived from the significance of the extrinsic reinforcement and sensory modality preference interaction. Although most pre-primary school children respond positively to verbal reinforcement, concrete rewards are often used during the initial stages of learning with some students. Consequently, the child that does require concrete incentives to enhance motivational tendencies toward academic

achievement may experience a distractibility of feedback effect as a result of such techniques. This condition is especially true for those children showing modal preferences in the visual sensory input channel. For visual learners, consideration of the magnitude of distractibility inherent in concrete incentive administration should be evaluated.

Based upon the exploratory nature of the study and the discussion of findings reported in previous sections, general recommendations are advanced in several areas. A reconceptualization and extension of the extrinsic reinforcement and sensory modality theoretical structure is suggested at three levels of concern: (1) performance task characteristics, (2) individual learner differences related to task performance, and (3) externally-based psychosituational conditions.

The overall interest level, complexity and general nomenclature of the instructional task should be evaluated in future research. Further effort should be directed toward the relationship between students' sensory modality learning preferences and the sensory instructional approach used. Visual, auditory and kinesthetically oriented learning tasks in conjunction with various extrinsic reinforcement conditions and modal preferences of the learner should be used as additional levels of comparison. A reconceptualization of sensory modality theory based upon extrinsic reinforcement considerations may further facilitate the individualization of instruction. Efforts designed to compare molar and task-specific assessments of academic achievement should be undertaken to advance further evaluation of the achievement motivation-performance relationship.

In consideration of individual learner differences related to task performance, further research should re-evaluate the extrinsic

reinforcement x sensory modality preference interaction. Extension of the findings may be enhanced through consideration of a variety of task related organismic variables prevalent in past extrinsic reinforcement efforts. For example, a reconceptualization of the issue based upon the socioeconomic status of the learner should be initiated. The differential effects of extrinsic incentives at various levels of sensory modality preference may not be consistent for both lower-class and middle-class children. Continued research may also provide clarification through assessment of the learner's developmental level and cognitive functioning in relation to chronological age. Specific emphasis should be placed upon multi-dimensional comparisons at several points along the social maturity-immaturity continuum for children within the borderline, average and superior levels of intellectual ability. However, some caution should be taken in the evaluation of these variables for children beyond the early primary school level. Since current theoretical speculation establishes a period of sensory modality strength equilization at age nine for most children, the inclusion of comparison groups beyond this age level does not appear warranted. Renewed interest in the historical antecedents evaluated through social history interview techniques should also be established. Specific topics of concern may include the level of parental demand for achievement, parental attitudes toward academic achievement, the encouragement of goal setting behavior, and the history of early social-material reinforcement schedules including an analysis of task-specific baselines of extrinsic incentives. In consideration of Horner's (1971) theoretical position, further attention should also be directed toward the function of Subjects' sex on the extrinsic reinforcement, achievement

motivation and sensory modality preference analysis.

Recommendations are also advanced through consideration of externally-based psychosituational conditions. Most importantly, continued research should be conducted to assess the application of the Distractibility Hypothesis to various curricular materials and instructional programs presently used in the pre-primary and elementary school classroom. A variety of concrete rewards, e.g., consumable, monetary, token, toys, etc., should be administered to ascertain distractibility and reinforcement effects. Attempts should be made to increase the meaningfulness of the concrete rewards under study. The effects of permitting visual, auditory and no-preference learners to select their own rewards from an assortment readily available should be determined.

Specific demand characteristics prevalent in any Subject-Experimenter interaction and subject to additional psychosituational influences makes generalization of the findings limited in scope. Pretraining procedures administered prior to the experimental session should be included as an attempt to equalize performance and instructional variables and reduce the distraction effects of extraneous conditions, stimuli interference and novelty of exposure to treatments. As a result of the present investigation, a reconceptualization and integration of the extrinsic reinforcement and sensory modality preference theoretical framework should provide direction for continued research in this area of inquiry.

A SELECTED BIBLIOGRAPHY

Adkins, D. C. and B. L. Ballif. Motivation to Achieve in School. Education Research and Development Center, University of Hawaii, Honolulu, Hawaii, January, 1970. Report to the U. S. Office of Economic Opportunity, Contract No. OEO B89-4576 and OEO 4121.

Atkinson, J. W. "Motivational Determinants of Risk-taking Behavior." Psychological Review, 64 (1957), 359-372.

Atkinson, J. W. (Ed.). Motives in Fantasy, Action and Society. Princeton: Van Nostrand Co., 1958.

Atkinson, J. W. and N. T. Feather (Eds.). A Theory of Achievement Motivation. New York: Wiley and Sons, 1966.

Baron, R. M. "Social Reinforcement as a Function of Social Reinforcement History." Psychological Review, 73 (1966), 527-539.

Bateman, Barbara. "The Efficacy of an Auditory and Visual Method on First-Grade Reading Instruction with Auditory and Visual Learning." In H. K. Smith (Ed.), Perception and Reading. Newark, Delaware: International Reading Association, 1968, 124-132.

Blair, J. R. "The Effects of Differential Reinforcement on the Discrimination Learning of Normal and Low Achieving Middle Class Boys." Child Development, 43 (1972), 251-255.

Brophy, J. E. "The Role of Rewards and Reinforcements in Early Education Programs: II. Fostering Intrinsic Motivation to Learn." Journal of School Psychology, 10 (1972), 243-251.

Bruner, J. S. Process of Cognitive Growth: Infancy. Worcester, Mass.: Clark University Press, 1968.

Bursuk, L. Z. "Sensory Mode of Presentation as a Factor in the Reading Comprehension Improvement of Adolescent Retarded Readers." Paper presented at the Annual Convention of the American Educational Research Association, Chicago, Illinois, 1971.

Buss, A. H. and Edith H. Buss. "The Effect of Verbal Reinforcement Combinations on Conceptual Learning." Journal of Experimental Psychology, 52 (1952), 282-287.

Cairns, R. B. "Informational Properties of Verbal and Nonverbal Events." Journal of Personality and Social Psychology, 5 (1967), 353-357.

Cameron, A. and T. Storm. "Achievement Motivation in Canadian Indian, Working and Middle Class Children." Psychological Reports, 16 (1965), 459-463.

Cernius, V. "Effects of Two Different Types of Reinforcers on Conceptual Thinking in Lower Class Boys: A Developmental Study." Proceedings of the Seventy-Sixth Annual Convention, American Psychological Association, 3 (1968), 617-618.

Cox, F. N. "An Assessment of the Achievement Behavior System in Children." Child Development, 33 (1962), 907-916.

Cradler, J. and D. Goodwin. "Conditions of Verbal Behavior as a Function of Age, Social Class and Type of Reinforcement." Journal of Educational Psychology, 62 (1971), 279-284.

Crandall, V. J., W. Katkovsky, and A. Preston. "Motivation and Ability Determinants of Young Children's Intellectual Achievement Behaviors." Child Development, 33 (1962), 643-661.

Crandall, V. J., A. Preston, and A. Rabson. "Maternal Reactions and the Development of Independence and Achievement Behavior in Young Children." Child Development, 31 (1960), 243-251.

Curry, C. "The Effects of Verbal Reinforcement Combinations on Learning in Children." Journal of Experimental Psychology, 59 (1960), 434.

Daniel, P. N. and R. S. Tacker. "Preferred Modality of Stimulus Input and Memory for CVC Trigrams." Journal of Educational Research, 67 (1974), 255-258.

Day, H. I., D. E. Berlyne, and D. E. Hunt (Eds.). Intrinsic Motivation: A New Direction in Education. Toronto: Holt, Rinehart and Winston of Canada, 1971.

Deci, E. L. "Effects of Externally Mediated Rewards on Intrinsic Motivation." Journal of Personality and Social Psychology, 18 (1971), 105-115.

Deci, E. L. "Intrinsic Motivation, Extrinsic Motivation and Inequity." Journal of Personality and Social Psychology, 22 (1972), 113-120.

Douvan, E. "Social Status and Success Striving." Journal of Abnormal Social Psychology, 52 (1956), 219-223.

Ferrell, J. C., Jr. "Performance of Negro Children as a Function of Sex of the E, Sex of the Ss and the Type of Reinforcement." Paper presented at the meeting of the Southeast Psychological Association, New Orleans, Louisiana, 1969.

French, E. G. "Development of a Measure of Complex Motivation." In J. W. Atkinson (Ed.), Motives in Fantasy, Action and Society. Princeton, N. J.: Van Nostrand, 1958, 242-248.

Freud, S. On Aphasia. New York: International University Press, 1953.

Frostig, M. "Corrective Reading in the Classroom." Reading Teacher, 18 (1965), 573-580.

Furth, H. G. Project and Knowledge. Englewood Cliffs, New Jersey: Prentice-Hall, 1969.

Gagne, R. M. Learning and Individual Differences. A Symposium of the Learning, Research and Development Center, University of Pittsburgh: Charles E. Merrill Books, Inc., Columbus, Ohio, 1967.

Gellistel, E. "The Relation of Visual and Auditory Aptitudes to First Grade Low Readers' Achievement Under Sight-Word and Systematic Phonic Instrumentation." Current Issues in Reading. (1972), Eric Abstracts, ED 079714.

Good, T. L. "The Role of Rewards and Reinforcements in Early Education Programs: III. The Use of Concrete Rewards." Journal of School Psychology, 10 (1972), 253-261.

Gray, S. W., R. A. Klaus, J. O. Miller, and B. J. Forrester. Before First Grade. New York: Teacher's College Press, 1966.

Harris, H. J. "Individualizing First Grade Reading According to Specific Learning Aptitudes." New York: Office of Research and Evaluation, Division of Teacher Education of the City University of New York, 1965.

Hassett, Irene D. "The Effects of Type of Reinforcer on Several Lower-Class Cultural Groups." Dissertation Abstracts International, 31 (10-A), 1971, 5200.

Hodges, W. L. "The Role of Rewards and Reinforcements in Early Education Programs: I. External Reinforcement in Early Education." Journal of School Psychology, 10 (1972), 233-241.

Horner, M. S. "The Psychological Significance of Success in Competitive Achievement Situations: A Threat as Well as a Promise." In H. I. Day, D. E. Berlyne and D. E. Hunt (Eds.), Intrinsic Motivation: A New Direction in Education. Toronto: Holt, Rinehart and Winston of Canada, Limited, 1971, 46-60.

Hurley, J. R. "The Iowa Picture Interpretation Test: A Multiple Choice Variation of the TAT." Journal of Consulting Psychology, 19 (1955), 372-376.

Kagan, Jerome. Understanding Children: Behavior, Motives and Thought. New York: Harcourt, Brace, Jovanovich, 1971.

Kirk, R. E. Experimental Design: Procedures for the Behavioral Sciences. California: Brooks/Cole Publishing Co., 1968.

Kirwin, P. M. "Performance of Lower Class Children as Related to Type of Task, Difficulty Level and Incentive Condition." (Unpublished doctoral dissertation, University of Texas, Austin, Texas, 1968.)

Klinger, E. "Fantasy Need Achievement as a Motivational Construct." Psychological Bulletin, 66 (1966), 291-308.

Korman, A. K. The Psychology of Motivation. Englewood Cliffs, New Jersey: Prentice-Hall, Incorporated, 1974, 201.

Lepper, M. R., D. Greene, and R. E. Nisbett. "Undermining Children's Intrinsic Interest with Extrinsic Rewards: A Test of the Over-justification Hypothesis." Journal of Personality and Social Psychology, 28 (1973), 129-137.

Lesser, Gerald S. Psychology and Educational Practice. Glenview, Illinois: Scott, Foresman and Company, 1971, 130-154.

Lipe, D. and S. M. Jung. "Manipulating Incentives to Enhance School Learning." Review of Educational Research, 41 (1971), 249-280.

Litwin, W. J. "The Effects of Verbal, Visual, Auditory and Gustatory Reinforcement on Discrimination Learning in Preschool Children." (Unpublished master's thesis, West Chester State College, West Chester, Pennsylvania, 1974.).

Maehr, M. L. and D. D. Sjogren. "Atkinson's Theory of Achievement Motivation: First Step Toward a Theory of Academic Motivation?" Review of Educational Research, 41 (1971), 143-161.

Marshall, H. H. "Learning as a Function of Task Interest, Reinforcement and Social Class Variables." Journal of Educational Psychology, 60 (1969), 133-137.

McClelland, D. C. "Risk Taking in Children with High and Low Need for Achievement." In J. W. Atkinson (Ed.), Motives in Fantasy, Action and Society. Princeton: Van Nostrand Company, Inc., 1958, 306-321.

McClelland, D., J. Atkinson, R. Clark, and E. Lowell. The Achievement Motive. New York: Appleton-Century-Crofts, 1953.

McGrade, B. J. "Social Class and Reinforcer Effects in Discrimination Learning." Psychonomic Science, 12 (1968), 140.

McKeachie, W. "Instructional Psychology." Annual Review of Psychology, 25 (1974), 161-187.

Meyer, William J. and Stanley B. Seidman. "Relevant Effectiveness of Different Reinforcement Combinations on Concept Learning at Two Developmental Levels." Child Development, 32 (1961), 117-127.

Miller, F. D. and G. H. Moffat. "The Effect of Verbal Reinforcement on Children's Learning. Final Report." (1970), Eric Abstracts, ED 044752, 54 p.

Montessori, Maria. The Montessori Method. New York: Frederick A. Stokes, 1912.

Morency, A. "Auditory Modality, Research and Practice." In H. K. Smith (Ed.), Perception and Reading. Proceedings of the International Reading Association, 12 (1968).

Mumbauer, Corine C. "Influence of Subject and Situational Variables on the Persistence of First Grade Children in a Test-Like Situation." (1970), Eric Reports, ED 052819, 7 p.

Oconner, P. A., J. W. Atkinson, and M. Horner. "Motivational Implications of Ability Grouping in Schools." In J. W. Atkinson and N. T. Feather (Eds.), A Theory of Achievement Motivation, New York: Wiley, 1966.

Piaget, J. The Construction of Reality in the Child. New York: Basic Books, 1954.

Reiken, H. "A Program for Research on Experiments in Social Psychology." In N. F. Washbourne (Ed.), Decisions, Values and Groups. London: Pergamon Press, 2 (1962), 75-141.

Reiner, Helen D. "Children's Learning as a Function of Type of Reinforcement, Task, Grade Level, Social Class and Sex." Dissertation Abstracts International, 33 (5-A), 1972, 2179-A.

Ringler, L. H., I. L. Smith, and B. E. Cullinan. "Modality Preference, Differential Presentation of Reading Task, and Word Recognition of First-Grade Children." Paper presented at the annual Convention of the International Reading Association, Atlantic City, New Jersey, 1971.

Robinson, H. M. "Visual and Auditory Modalities Related to Methods for Beginning Reading." Reading Research Quarterly, 8 (1972), 7-39.

Rosen, B. and R. D'Andrade. "The Psychosocial Origins of Achievement Motivations." Sociometry, 22 (1959), 185-218.

Sinsheimer, R. L. "The Brain of Pooh: An Essay on the Limits of the Mind." American Scientist, 59 (1971), 20-28.

Smith, C. M. "The Relationship of Reading Method and Reading Achievement to ITPA Sensory Modalities." Journal of Special Education. (1971), 143-149.

Smith, Charles P. (Ed.). Achievement Related Motives in Children, Russel Sage Foundation, New York, 1969, 102-150.

Spence, J. T. "The Effects of Verbal Reinforcement Combination on the Performance of a Four-Alternative Discrimination Task." Journal of Verbal Learning and Verbal Behavior, 5 (1966), 421-428.

Spence, J. T. "A Study of Certain Factors Affecting Children's School Performance." (1966), Eric Abstracts, ED 011086, 41 p.

Spence, J. T. "The Distracting Effects of Material Reinforcers in the Discrimination Learning of Lower and Middle Class Children." Child Development, 41 (1970), 103-111.

Spence, J. T. and M. C. Dunton. "The Influence of Verbal and Nonverbal Reinforcement Combinations in the Discrimination Learning of Middle and Lower Class Preschool Children." Child Development, 38 (1967), 1177-1186.

Spence, J. T. and L. L. Segner. "Verbal and Nonverbal Reinforcement Combinations in the Discrimination Learning of Middle and Lower Class Children." Child Development, 38 (1967), 29-38.

Stephenson W. The Study of Behavior: Q-Technique and Its Methodology. Chicago: University of Chicago Press, 1953.

Teager, J. and C. Stern. "Conditions Fostering the Use of Informative Feedback by Young Children." Research in Education (1969), Eric Abstracts, ED 029688, 13 p.

Terrell, G., K. Durkin and M. Wiesley. "Social Class and the Nature of the Incentive in Discrimination Learning." Journal of Abnormal and Social Psychology, 59 (1959), 270-272.

Terrell, G. and W. A. Kennedy. "Discrimination Learning and Transposition in Children as a Function of the Nature of the Reward." Journal of Experimental Psychology, 53 (1957), 257-260.

Thorndike, E. L. "The Law of Effect: A Roundtable Discussion." Psychological Review, 45 (1938), 204-205.

Tiber, N. and W. A. Kennedy. "The Effects of Incentives on the Intelligence Test Performance of Different Social Groups." Journal of Consulting Psychology, 28 (1964), 187.

Treadway, K. S. "The Relationship Between Pre-Reading Behavior Patterns and Success of Specific Reading Methods with Kindergarten Children." (Unpublished doctoral dissertation, Oklahoma State University, Stillwater, Oklahoma, 1975.)

Underwood, Benton J. Experimental Psychology. New York: Appleton-Century-Crofts, 1966.

Unikel, I. P., G. S. Strain, and H. F. Adams. "Learning of Lower Socioeconomic Children as a Function of Social and Tangible Reward." Developmental Psychology, 1 (1969), 553-555.

Urlich, R., S. Louissell, and M. Wolfe. "The Learning Village: A Behavioral Approach to Early Education." Educational Technology, 11 (1971), 32-45.

Waugh, R. P. "Relationship Between Modality Preference and Performance." Exceptional Children, 39 (1973), 465-469.

Wepman, J. M. "The Perceptual Basis of Learning." In H. A. Robinson (Ed.), Meeting Individual Differences in Reading. Chicago: University of Chicago Press, 1964, 7-26.

Wepman, J. M. "The Modality Concept." In H. Smith (Ed.), Perception and Reading. Newark: International Reading Association, 1968.

Wepman, J. M. "The Modality Concept: Background and Research." Paper presented at the annual Convention of the International Reading Association, Atlantic City, New Jersey, 1971.

Wepman, J. M. and A. Morency. "Perceptual Processes and Achievement." Final Report--Project #70461, OEG #3-7-070361-4543, 1971.

Young, D. J. "The Relationship Between Pre-Reading Behavior Patterns and Success of Specific Reading Methods with Kindergarten Children." (Unpublished doctoral dissertation, Oklahoma State University, Stillwater, Oklahoma, 1975.)

Zigler, E. and J. DeLabry. "Concept-Switching in Middle-Class, Lower-Class and Retarded Children." Journal of Abnormal and Social Psychology, 65 (1962), 267-273.

APPENDIX A

INSTRUMENTATION

Instrumentation

Animal Crackers: A Test of Motivation to Achieve (Adkins and Baliff, 1975)

Animal Crackers is primarily a group administered, diagnostic test that provides an assessment of a child's motivation to achieve. The developmental rationale for construction of the test materials is based upon the difficulties encountered in the use of traditional projective methods to accurately measure achievement motivation in very young children. Essentially requiring little expressive verbal ability, Animal Crackers utilizes an objective-projective technique and requires that the child choose between verbally described alternative behaviors or attitudes representative of motivational differences in school achievement.

The test itself requires that the subject select one of two identical animals for each item that differ in school related verbal descriptions only. In essence, the child chooses his own animal that behaves as he behaves, likes what he likes and does what he does. Responses are recorded by the child in an individual test booklet. Advantages of the instrument include group administration capabilities, ease of scoring and a 30 to 45 minute administration time. Animal Crackers is appropriate for preschool, kindergarten and first grade level children.

Atkins and Baliff suggest that the achievement oriented behavior from which motivation to achieve is inferred may be represented as five (5) discrete areas. In addition, each of the component areas provides for a unique way of assessing self-attitudes established through the

presentation of similar sets of cues. The authors provide a description of the component parts of achievement motivation as they perceive them:

School Enjoyment. This area attempts to ascertain the degree to which the child expects to enjoy working and accomplishing in school. That expectation is reflected in items in which he indicates whether he likes to learn and whether he prefers certain learning activities to other activities.

Self-Confidence. This area focuses on the child's concept of himself as successful or unsuccessful in achieving his goals. The items dealing with this area . . . relate generally to the child's self-image.

Purposiveness. The child's ability to set up purposes for directing his behavior is reflected in this area. The items suggest working toward future goals.

Instrumental Activity. Closely related to purposiveness of behavior is the knowledge of and ability to engage in instrumental steps toward accomplishing established purposes. Items in this area deal with an orientation toward autonomous activity, the appropriate use of time, and interaction with others.

Self-Evaluation. The items in this area attempt to ascertain the child's ability to evaluate his performance. Self-evaluation is reflected in items that test whether the child knows when his work is right, when he is doing well in school, what he can and cannot do and whether he always does his best.

In the standardization of Animal Crackers, the authors utilized a stratified national sample of kindergarten and first grade children. Testing was accomplished for 10,899 children in some 2,500 school districts. The initial testing of 5,710 children was conducted in the fall, 1973. Additional testing for 5,189 children was performed in April, 1974. From the data obtained, fall and spring age norms were calculated and are available at both the kindergarten and first grade level.

Kuder-Richardson Formula 20 reliability coefficients measuring the internal consistency for the twelve-item component scores for Animal Crackers are reported to range from 0.69 to 0.85 for kindergarten, and from 0.88 to 0.92 for first grade. Overall KR-20 reliability coefficients for the total test are 0.94 for fall testing and 0.95 for spring testing for the kindergarten group. Fall and spring coefficients for the first grade sample are both reported as 0.98.

Because validity criteria are somewhat difficult to define for affective domain variables, the authors attempt to provide inferential data concerning the overall validity of the instrument. Animal Crackers originated as a major revision of its predecessor, Gumpgookies, and does share a similar theoretical orientation. Criterion-related validity of Animal Crackers may be assumed from research results reported with the earlier instrument (Adkins and Baliff, 1970a). Findings reported show low positive correlations with age and intelligence. Correlation coefficients with the Stanford-Binet Intelligence Test range from 0.20 to 0.35. In addition, statistically significant Chi Square relationships between test scores and teacher ratings of individual children's motivation are reported in the examiner's manual.

Kindergarten Screening Test (KST)

(Young, 1975)

The Kindergarten Screening Test assembled by Young (1975) was the result of experimental efforts to identify and evaluate kindergarten children's pre-reading abilities in the cognitive and psychomotor areas as predictors of future success with differential methods of reading instruction. The study investigated the relationship of 31 reading readiness variables based upon subsequent performance in four approaches to reading instruction: the Auditory-Visual Method, the Visual-Auditory Method, the Linguistic-Word Structure Method and the Linguistic-Language Experience Method. In a companion study developed by Treadway (1975), six additional unique variables were evaluated. In addition to the identification of highly significant predictors of reading success related to specific instructional method, the variables identified as accounting for the highest percentage of variance also indicated a strong relationship between the Auditory-Visual and Linguistic-Word Structure methods. In addition, a significant relationship was also evidenced between the Visual-Auditory and the Linguistic-Language Experience methods. These indications provided an appropriate rationale for the grouping of predictor variables based upon reported relationships in efforts to assess sensory modality preferences essential to the methodological concerns of the present investigation.[1]

A description of the composite subtests drawn from the Young and Treadway studies and utilized in the assessment of visual, auditory and

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[1]Appendix B, Table VIII, demonstrates specific subtests utilized in the assessment of visual and auditory channel preferences.

no-preference learners will be advanced. For purposes of the current investigation, an abbreviated version of the KST was administered based upon predictors providing the highest accountability of explained variance. The first section will describe subtests administered under group instruction procedures. Subtests drawn from the Murphy-Durrell Readiness Test (MDRT), H. Murphy and Donald D. Durrell (1964), included the Learning Rate and Letter Names II. Also, the Numbers, Alphabet and Word Meaning subtests were taken from the Metropolitan Readiness Tests (MRT), Form A, Hildreth, Griffiths and McGauven (1965).

Learning Rate Test (MDRT). The purpose of the Learning Rate Test is to determine the number of words that a child is able to learn in one day under standard conditions of presentation. Since the Learning Rate Test does not correlate highly with the Phonemes Test or the Letter Names Test, it serves the unique purpose of measuring a different component of pupil's readiness to read.

The nine words in the Learning Rate Test include nouns, verbs, and adjectives, all meaningful to children and easily illustrated. Each word is presented in three different ways--in print on the chalkboard, in print on a flash card, and in the test booklet. At each presentation, the names of the words are given by the teacher and repeated by the children, and meanings are stressed. One hour after teaching, children are asked to identify the words in two multiple-choice situations: the first requires the child to discriminate the word from other words taught; the second requires the discrimination among words similar in form, but not taught.

Letter Names II Test (MDRT). Knowledge of letter names is usually

the child's first perceptual achievement directly related to reading, his first association of sound with print. Both capital and lower-case letters are included in the test. However, lower-case letters are more important to reading. It requires identification of letters names by the teacher. For pupils to give the names of letters is more difficult and requires individual testing. Most letter names contain their sounds, with an extraneous vowel to complete the "name." Children who have attached names to letters will learn to read much more readily than those who have not. This test points out that what is necessary is to have the name or sound attached to the letter.

Alphabet Test (MRT). The Alphabet subtest is designed to test the child's ability to recognize lower-case letters of the alphabet. In the 16-item test, the pupil responds by selecting a letter named from four alternatives.

Numbers Test (MRT). The Number subtest consists of a 26-item test based upon knowledge of numbers. The pupil selects from three pictures the one which denotes size, time and similar number concepts.

Word Meaning Test (MRT). The Word Meaning subtest measures the child's memory of verbal concepts. It is presented in the form of a picture vocabulary test and allows the child to demonstrate his oral vocabulary abilities. Words are primarily selected from standard kindergarten and primary word lists. Vocabulary is possibly one of the most valid indicators of general mental maturity. It is believed that the Word Meaning Test provides for a representation of this general mental maturity in the total readiness score.

The second section of the screening test includes subtests that are individually administered. These subtests were drawn from the Illinois Test of Psycholinguistic Abilities (ITPA), McCarthy and Kirk (1968) and the Wechsler Preschool and Primary Scale of Intelligence (WPPSI), Wechsler (1949).

A test utilized from the ITPA was Grammatic Closure subtest; while the tests included from the WPPSI were the Vocabulary and Geometric Design subtests.

Grammatic Closure Test (ITPA). This test evaluates functions at the automatic level, which indicates ability to integrate units into wholes. The test assesses the child's ability to make use of the redundancies of oral language in acquiring automatic habits for handling syntax and grammatic inflections. The child is asked to respond automatically to often repeated verbal expressions of standard American speech.

Vocabulary Test (WPPSI). This test is classified as one of the five verbal tests given for determining the child's ability to identify with word definitions. The examiner provides oral stimulus and the subject responds orally. This subtest measures many of the same mental processes that are measured by information and similarities. It serves to suggest the general level of auditory comprehension.

Geometric Design Test (WPPSI). The child is presented with a stimulus picture of a geometric design and is asked to reproduce the design with a pencil. The test measures the child's ability to reproduce geometric figures and evaluates the visual-motor organization

and calls attention to behavioral lags of the child.

Visual Discrimination Learning Task

As an attempt to gain meaningful measurements of differential reinforcement effectiveness, a three-choice visual discrimination learning task was specifically developed for use in the study. Although the general nature of the testing instrument possesses characteristics similar to a task employed by Spence and Segner (1967), the overall procedures used in its construction differ significantly. The learning task will consist of four sets of line drawings, three drawings per set, that are familiar to the subjects. All specific sets of line drawings will consist of unrelated objects (i.e., a cash register, airplane and ball).

A preference study was conducted as a means to secure relatively similar sets of line drawings for use on the task. Prior to the study, a total of 60 line drawings were gathered for possible inclusion in the learning task. From these drawings, 30 pictures were randomly selected for use in the preference study. Subjects for the preference study consisted of 25 kindergarten children participating in the Pawnee Public School program located in the small East Central Oklahoma town.

Procedures for the preference study followed a modification of the Q-sort Technique first introduced by Stephenson (1953). Each child was asked to distribute the line drawings along one effective dimension, that is, degree of preference. Distribution of the drawings was guided by the categories of "Really Like," "OK" and "Don't Like." A form of the "face technique" was used to aid the child in remembering the categories. Weighted scores were established to indicate the

overall Preference Score for each line drawing. Selection of line drawings for inclusion in the task within each of the four sets was based upon the calculated Preference Score Index.[2] Each set of line drawings consisted of pictures of equal preference. The fact that all pictures chosen for use in the instrument were taken from those established as positively preferred provided a task that is most likely acceptable in content to each child. The preference study was an attempt to equate the line drawings within each set, removing as much initial subject response bias as possible from subsequent measurements.

One complete trial is defined as a single presentation of each of the four sets of line drawings. Since the maximum length of the discrimination task is 15 trials, it was necessary to prepare a slide presentation containing 60 sets of line drawings. The serial position of each of the four sets of line drawings were counterbalanced throughout the trials. In addition, the left-center-right spacial position of each set of line drawings was randomized across orders.[3]

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[2]Appendix B, Table IX, provides a listing of the raw data gathered through preference study procedures. A weighted Preference Score Index is also included for each line drawing administration.

[3]A complete list of the sequential positioning for the first fifteen sets of line drawings is presented as Table X in Appendix B.

APPENDIX B

SUPPLEMENTARY DATA

TABLE VI

SUMMARY OF ACHIEVEMENT MOTIVATION ASSESSMENT PRESENTED FOR EACH SUBJECT IN RANK ORDER FORM

S_s	Achievement Motivation Score	Rank	S_s	Achievement Motivation Score	Rank
7	30	1.0	4	49	39.0
8	31	2.5	14	49	39.0
65	31	2.5	19	49	39.0
28	32	5.0	33	49	39.0
72	32	5.0	84	49	39.0
75	32	5.0	41	50	42.5
27	33	8.0	58	50	42.5
60	33	8.0	6	51	45.5
70	33	8.0	34	51	45.5
18	34	10.0	37	51	45.5
52	36	11.0	90	51	45.5
16	37	12.0	29	52	50.0
53	38	13.0	57	52	50.0
24	39	14.5	85	52	50.0
59	39	14.5	87	52	50.0
61	40	16.0	88	52	50.0
69	41	17.0	46	53	54.0
54	42	19.0	62	53	54.0
81	42	19.0	73	53	54.0
86	42	19.0	2	54	59.5
89	43	21.0	23	54	59.5
56	44	22.0	35	54	59.5
1	45	26.0	44	54	59.5
20	45	26.0	66	54	59.5
25	45	26.0	68	54	59.5
32	45	26.0	74	54	59.5
50	45	26.0	83	54	59.5
64	45	26.0	15	55	66.0
67	45	26.0	48	55	66.0
11	46	30.0	49	55	66.0
17	47	32.5	79	55	66.0
22	47	32.5	82	55	66.0
39	47	32.5	9	56	71.0
40	47	32.5	26	56	71.0
10	48	35.5	36	56	71.0
13	48	35.5	38	56	71.0

TABLE VI (CONCLUDED)

S_s	Achievement Motivation Score	Rank	S_s	Achievement Motivation Score	Rank
63	56	71.0	55	58	81.5
3	57	76.5	78	58	81.5
12	57	76.5	5	59	86.5
21	57	76.5	31	59	86.5
30	57	76.5	43	59	86.5
45	57	76.5	76	59	86.5
47	57	76.5	77	59	86.5
42	58	81.5	80	59	86.5
51	58	81.5	71	60	90.0

TABLE VII

SUMMARY OF VISUAL-AUDITORY SENSORY MODALITY DISCREPANCIES PRESENTED BY RANK ORDER AS STANDARD SCORE TRANSFORMATIONS

S_s	Visual	Auditory	Visual-Auditory Discrepancy	Rank
13	-2.2624	-0.4019	-1.8605	1.0
34	-1.3179	0.3896	-1.7075	2.0
63	-1.8688	-0.3228	-1.5461	3.0
12	0.5711	1.8934	-1.3224	4.0
61	-1.7901	-0.5602	-1.2299	5.0
49	0.8072	1.9726	-1.1654	6.0
16	-2.1837	-1.0351	-1.1486	7.0
4	0.5711	1.6560	-1.0849	8.0
71	0.4136	1.4977	-1.0841	9.0
41	0.0988	1.1811	-1.0823	10.0
40	-1.1605	-0.0853	-1.0752	11.0
42	1.1220	2.0517	-0.9297	12.0
77	-0.0586	0.8645	-0.9231	13.0
64	-0.8457	0.0730	-0.9187	14.0
24	-2.2624	-1.3517	-0.9107	15.0
45	-0.8457	-0.0853	-0.7603	16.0
38	0.4924	1.1811	-0.6887	17.0
3	-0.8457	-0.1645	-0.6812	18.0
83	0.1775	0.7062	-0.5287	19.0
59	1.2794	1.7351	-0.4557	20.0
62	-0.1373	0.3104	-0.4477	21.0
76	0.6498	1.0228	-0.3730	22.0
25	0.4924	0.8645	-0.3721	23.0
29	-0.0586	0.3104	-0.3690	24.5
37	-0.0586	0.3104	-0.3690	24.5
78	-0.1373	0.2313	-0.3686	26.0
80	1.1220	1.4185	-0.2965	27.0
66	1.0433	1.3394	-0.2961	28.0
15	0.7285	1.0228	-0.2943	29.0
19	0.3349	0.6270	-0.2921	30.0
72	-0.6882	-0.4019	-0.2863	31.0
81	-1.3179	-1.0351	-0.2828	32.0
75	-1.7114	-1.4309	-0.2806	33.0
39	-1.5540	-1.3517	-0.2023	34.0
28	-2.4985	-2.3015	-0.1970	35.0
36	1.0433	1.1811	-0.1378	36.0
82	0.5711	0.7062	-0.1351	37.0

TABLE VII (CONTINUED)

S_s	Visual	Auditory	Visual-Auditory Discrepancy	Rank
47	-0.0586	0.0730	-0.1316	38.0
73	-1.7114	-1.5892	-0.1223	39.0
85	0.3349	0.3896	-0.0547	40.0
31	-0.6882	-0.6394	-0.0489	41.0
35	0.5711	0.5479	0.0232	42.0
43	0.4924	0.4687	0.0236	43.0
87	-1.0031	-1.0351	0.0320	44.0
89	-1.7901	-1.8266	0.0365	45.0
86	0.9646	0.8645	0.1001	46.0
65	1.7517	1.5768	0.1748	47.0
5	1.0433	0.8645	0.1788	48.0
50	0.9646	0.7853	0.1792	49.0
21	0.7285	0.5479	0.1806	50.0
1	0.5711	0.3896	0.1815	51.0
18	0.0988	-0.0853	0.1841	52.0
8	0.0201	-0.1645	0.1846	53.0
33	-0.3734	-0.5602	0.1868	54.0
23	-0.8457	-1.0351	0.18945	55.0
11	-0.9244	-1.1143	0.18990	56.0
7	1.1220	0.8645	0.25751	57.0
10	0.8859	0.5479	0.33799	58.0
55	0.6498	0.3104	0.33932	59.0
17	0.4924	0.1521	0.34021	60.0
90	0.3349	-0.0062	0.34110	61.0
20	0.1775	-0.1645	0.34198	62.5
60	0.1775	-0.1645	0.34198	62.5
30	-1.3966	-1.7475	0.35086	64.0
74	1.3581	0.9436	0.41448	65.0
54	0.4924	0.0730	0.41936	66.0
46	1.3581	0.8645	0.49363	67.0
70	-0.2160	-0.7185	0.50250	68.0
57	-0.5308	-1.0351	0.50428	69.0
69	0.1775	-0.4019	0.57943	70.0
48	-0.2947	-0.8768	0.58210	71.0
27	-0.3734	-0.9560	0.58254	72.0
88	1.3581	0.7062	0.65193	73.0
2	0.9646	0.3104	0.65415	74.0
26	-0.1373	-0.7977	0.66036	75.0
9	0.8859	0.1521	0.73374	76.0
44	-0.9244	-1.6683	0.74395	77.0

TABLE VII (CONCLUDED)

S_s	Visual	Auditory	Visual-Auditory Discrepancy	Rank
14	0.7285	-0.0853	0.81378	78.0
58	1.2007	0.3104	0.89027	79.0
22	0.3349	-0.5602	0.89515	80.0
56	-0.2947	-1.1934	0.89870	81.0
6	0.8859	-0.0853	0.97119	82.0
79	0.7285	-0.2436	0.97208	83.0
53	0.7285	-0.3228	1.05123	84.0
84	0.2562	-0.7977	1.05389	85.0
67	-1.0031	-2.0641	1.06099	86.0
51	1.4368	0.3104	1.12639	87.0
68	-0.3734	-1.5100	1.13659	88.0
52	0.0201	-1.5100	1.53012	89.0
32	0.7285	-1.1143	1.84273	90.0

TABLE VIII

SUMMARY OF SIGNIFICANT PREDICTORS FOR VISUAL-AUDITORY, LINGUISTIC-WORD STRUCTURE, AUDITORY-VISUAL AND LINGUISTIC-LANGUAGE EXPERIENCE METHODS*

Methodology	Significant Predictor	Percentage of Explained Variation	Predictor Used to Establish SMP
Visual-Auditory	Letter Names II	58%	SMP-V
	Alphabet	55%	SMP-V
	Geometric Design	14%	SMP-V
	Word Meaning	9%	SMP-V
	Learning Rate	5%	
	Auditory Association	5%	
Linguistic-Word Structure	Letter Names II	70%	SMP-V
	Alphabet	64%	SMP-V
	Learning Rate	10%	
	Picture Completion	8%	
	Animal House	4%	
Auditory-Visual	Learning Rate	52%	SMP-A
	Grammatic Closure	43%	SMP-A
	Vocabulary	14%	SMP-A
	Visual Association	9%	
	Sound Blending		
Linguistic-Language Experience	Learning Rate	63%	SMP-A
	Numbers	51%	SMP-A
	Sound Blending	17%	
	Animal House	6%	
	Alphabet	6%	

*Note: Adapted from Young (1975) and Treadway (1975).

TABLE IX

SUMMARY OF VISUAL DISCRIMINATION LEARNING TASK
WEIGHTED PREFERENCE SCORES ESTABLISHED BY
Q-SORT PROCEDURES*

	Slide	Positive Preference	No Preference	Negative Preference	Weighted Preference Score Index
1.	Horse	21	2	2	69
2.	Register	16	8	1	65
3.	Airplane	17	6	2	65
4.	Ball	15	10	0	65
5.	Dog	16	7	2	64
6.	Piano	14	9	2	62
7.	Trumpet	18	1	6	62
8.	Guitar	14	8	3	61
9.	Giraffe	14	7	4	60
10.	Tree	13	9	3	60
11.	Sailboat	14	6	5	59
12.	Duck	13	8	4	59
13.	Cow	12	10	3	59
14.	Train	14	6	5	59
15.	Pencil	11	10	4	57
16.	Telephone	8	16	1	57
17.	Clock	13	6	6	57
18.	Chicken	13	5	7	56
19.	Keys	9	12	4	55
20.	Bell	11	7	7	54
21.	Light Bulb	10	9	6	54
22.	Chair	8	11	6	52
23.	Lamb	8	11	6	52
24.	Door	8	10	7	51
25.	Vacuum	7	12	6	51
26.	Whistle	9	7	9	50
27.	Sock	8	6	11	49
28.	Tin Can	7	5	13	44
29.	Wasp	2	1	22	30

*Note: Positive Preference, No Preference and Negative Preference Scores were weighed 3, 2 and 1 point, respectively to arrive at a total Weighted Preference Score.

TABLE X

COUNTERBALANCED SERIAL-ORDER POSITION OF FIRST TWENTY-FOUR SLIDE PRESENTATIONS SELECTED FROM LINE DRAWING PREFERENCE STUDY

Order of Slide Presentation	Position		
	1	2	3
1	Register	Airplane	Ball
2	Guitar	Giraffe	Tree
3	Pencil	Phone	Clock
4	Lamb	Door	Vacuum
5	Register	Ball	Airplane
6	Giraffe	Tree	Guitar
7	Phone	Clock	Pencil
8	Door	Vacuum	Lamb
9	Ball	Airplane	Register
10	Tree	Guitar	Giraffe
11	Clock	Pencil	Phone
12	Vacuum	Door	Lamb
13	Airplane	Ball	Register
14	Giraffe	Guitar	Tree
15	Phone	Pencil	Clock
16	Vacuum	Lamb	Door
17	Ball	Register	Airplane
18	Tree	Giraffe	Guitar
19	Clock	Phone	Pencil
20	Door	Lamb	Vacuum
21	Airplane	Register	Ball
22	Guitar	Tree	Giraffe
23	Pencil	Clock	Phone
24	Lamb	Vacuum	Door

VITA

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Candidate for the Degree of

Doctor of Education

Thesis: THE EFFECTS OF EXTRINSIC REINFORCEMENT, ACHIEVEMENT MOTIVATION AND SENSORY MODALITY PREFERENCE ON VISUAL DISCRIMINATION LEARNING IN KINDERGARTEN CHILDREN

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