ABSTRACT

THE RELATIONSHIP OF SEX ROLE IDENTITY ATTENTION AND READINESS TO SELECTED PRESENTATION MODES IN INDIVIDUALIZED INSTRUCTION

By

Patrick J. Harrison

Purpose of the Study

The purpose of this study was to investigate the relationship between the readiness level and sex of first grade students and various presentation modes in an individualized audiovisual lesson. The presentation modes studied were: (1) visual mode as 35 mm slides or flat pictures, (2) audio mode as male or female narrator.

Procedures

The experimental population consisted of eighty-two first grade students from a school in a racially-mixed lower socioeconomic neighborhood. The school was located in a mid-western town of approximately 120,000 people. A sample of sixty-four subjects was randomly selected and divided into four groups by sex and the median score on the Metropolitan Readiness Test. The subjects were then randomly assigned, four to a group, to sixteen experimental

treatment groups. Each group received an audiovisual lesson designed to test the effectiveness of a particular combination of audio and visual presentation mode in relation to the subjects readiness level and sex.

A sequence of two lessons on ordinal numbers was developed for use in the experiment. The materials were developed by conducting a survey of the mathematics textbooks of the major publishers, developing a preliminary program and then refining it by a tryout-revise-tryout procedure.

The narrators for the audio presentation mode were selected by a panel of five teachers using a rating scale. The visuals used in the lession were all black and white line drawings. When the slides were projected in the experiment the figures were the same size as the figures in the flat picture version.

The effects of the presentation mode and learner characteristics were measured with attitude and achievement tests developed for the study. When used in the experiment, the attitude test had a reliability of .66 and the achievement test a reliability of .67. There was a correlation of .51 between the two tests.

The experiment was conducted in a room which had been equipped with eight individual carrels. One group of four carrels was equipped with slide projectors and the other group of four carrels contained copies of the flat visuals. One tape recorder and a junction box with four

headsets supplied the sound to each group of four carrels. The subjects participated in the two segments of the lesson on consecutive days.

The statistical hypotheses were tested using a fixed effects model for analysis of variance. Two separate analyses, both using the same design, were performed. Scores on the achievement test were used in the first analysis and scores on the attitude test were used in the second analysis. All hypotheses were tested using the .10 level of confidence with the appropriate degrees of freedom.

Conclusions

The analysis of the achievement and attitude test results supports the following conclusions:

1. The students with Metropolitan Readiness Test scores above the population median had higher achievement test scores than students with readiness scores below the median. No relationship was found between student attitudes and scores on the readiness test. With one exception, the students readiness level did not make any difference in the attitude or achievement level of either male or female students who were exposed to a program incorporating any combination of the experimental audio or visual presentation modes. The

exception was a readiness and narrator interaction on the attitude test.

2. When achievement test scores were used to measure the effects of male and female narrators there were no differences between the test scores of male or female students who heard either a male or a female narrator. When attitude test scores were used to measure the same interaction the male students who heard a male narrator and the female students who heard a female narrator achieved higher test scores than the students who heard a narrator of the opposite sex. A higher attitude test score signified a more positive attitude.
3. The scores on both the attitude and achievement tests were higher for students who were exposed to the visual material as 35 mm slides than for the students who were exposed to the visuals as flat pictures.

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A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

College of Education

1970

ACKNOWLEDGMENTS

Grateful acknowledgment is made to the following people:

To Dr. Paul W. F. Witt, Chairman of my Guidance Committee, who provided many helpful suggestions, encouragement and understanding, throughout the course of this study and the writer's doctoral program.

To Dr. Norman Bell, for his timely advice and assistance on the design of the study.

To Dr. James Page for his advice and assistance.

To Dr. Winston Oberg for his suggestions and confidence.

To Dr. Andrew Porter and the staff of the College of Education Research Bureau for assistance in the design of this study and the treatment of the data.

To Dr. Elwood Miller, his staff, and especially to my fellow graduate students who provided a very important part of the education that I have received over the past two years.

And to my wife, Shari, for her help, patience and understanding.

P. J. H.

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CHAPTER I

THE PROBLEM

In an instructional system the teacher functions as a manager of learning resources, providing guidance, encouragement, inspiration and direction. As part of this leadership function the teacher attempts to provide the most appropriate learning resources available, selecting from various media such as textbooks, films, tape recordings and multi-media audiovisual programs.[1]

The selection process is complicated by variations in the presentation modes, characteristics of learners and message design which create a complex pattern of interacting relationships. In spite of these complications, classroom teachers have been choosing and using media to teach children for years. Where there are no empirical data upon which to base their choice, teachers are forced to use a mixture of past experience and intuitive judgment.

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[1] I. K. Davis in the Preface of Robert F. Mager, Developing Vocational Instruction (Palo Alto, California: Feron Publishers, 1967), p. V.

Briggs, in attempting to develop a procedure for the design of multi-media instruction, raises the age-old question of how to meet the individual needs of students.[2] Tayler describes the emerging role of the teacher as the manager of learning situations and the counselor of individual learners.[3] One way of meeting this role is through the adaptation of the systems approach. Davis describes this approach as follows:

> A fundamental, almost trivial, premise underlies this notion of improving the effectiveness of learning through the careful design of systems. It is this: there are alternative ways of presenting materials to different students--some of which are better than others. There are ways of presenting a subject matter that will encourage, and not discourage, further learning. There are ways of approaching a subject matter which will hold a student's attention and ways which will not. There are ways of designing a learning system to maximize student performance along prescribed dimensions and there are ways which will change his performance along unknown and perhaps undesirable dimensions. There are ways to design a learning system taking account of the fact that individuals differ from one another in their abilities, background, and style of learning, or one can refuse to take note of these differences and hope for the best.[4]

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[2]L. J. Briggs and others, Instructional Media: A Procedure for the Design of Multi-Media Instruction, A Critical Review of Research and Suggestions for Future Research (Palo Alto: American Institute for Research, 1967), p. 11.

[3]Keith I. Tayler, "The Impact of Instructional Television on Teaching Roles and Functions," Audiovisual Communication Review, 10:52, 1962.

[4]Robert H. Davis, "The Design of Learning Systems," (paper read at Gottlieb Duttweiler Institute, Ruschliken, Germany, November 20, 1968), p. 2.

If the systems approach is to be used, the behavioral goals which the student is to achieve must be defined, the attributes or characteristics which the student brings to the learning situation must be determined, the procedures and processes which are best suited to the students must be employed, and the performance of the students must be assessed according to the instructional objectives.[5] In order to adopt this approach, the classroom teacher needs to know which student characteristics interact with which instructional procedure so that the system will best serve each individual.

In attempting to increase the basis for decision making, this study represents a search for invariants in the pattern of relationships between presentation mode and learner characteristics.

Purpose

The purpose of this study is to investigate the relationship of the following presentation modes and learner characteristics to attitude and achievement in a multi-media lesson on ordinal numbers.

1. Readiness level as measured by the Metropolitan Readiness Test.
2. Male and female students.

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[5]Robert Glaser, "Psychological Bases for Instructional Design," Audiovisual Communication Review, 14:433-50, 1966.

3. The visual presentation mode as 35 mm slides or flat pictures.
4. The audio presentation mode as either a male or female narrator.

Specifically the study was designed to test the following hypotheses:

1. The student characteristic of readiness will interact with the audio presentation modes of male or female narrator and the visual presentation mode of 35 mm slides or flat pictures when the interaction is determined by scores on achievement and/or attitude test scores.
2. For students who are exposed to an audiovisual lesson the students who hear a like-sexed narrator will score higher on an achievement test and have a more favorable attitude than students who do not hear a like-sexed narrator.
3. Students will have a higher achievement test score and a better attitude towards an audio-visual lessen which presents the visual portion as 35 mm slides than a lesson which presents the visual portion as flat pictures.

Theory

This study considers whether the concept of readiness, as measured by the Metropolitan Readiness Test, should be considered a relevant entry behavior of students

as they approach an individualized audiovisual learning situation. The following presentation modes are also studied: the voice source as a male or female narrator and the visual source as 35 mm slides or flat pictures.

Readiness is a combination of abilities which result from nature and nuture interacting with each other. It has been described as the adequacy of existing capacity in relation to the demands of a given learning task.[6] The Metropolitan Readiness Test gives a score which is a composite of the following factors: linguistic attainment, visual and auditory perception, muscular coordination and motor skills, number knowledge, and the ability to follow directions.

Tyler indicates that one of the most important implications of individual differences for educators, particularly at the elementary level, has to do with the concept of readiness. If, as now seems probable, there are critical developmental periods for the acquisition of particular kinds of knowledge and skill, teachers should become sensitive to individual differences in readiness within the classroom and individualize instruction accordingly.[7]

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[6]David P. Ausubel, "View Points from Related Disciplines: Human Growth and Development," Teachers College Record, 60:245-54, 1959.

[7]Leona E. Tyler, "Individual Differences," Encyclopedia of Educational Research (New York: The Macmillan Company, 1969), p. 639.

The hypothesis in this study dealing with the sex of the narrator is related to the concept of sex role identity. Kagan states that by the time a child is seven he is intensely committed to modeling his behavior in concordance with cultural standards appropriate to his biological sex and he shows uneasiness, anxiety, and even anger when he is in danger of behaving in ways regarded as characteristic of the opposite sex. The desire to establish a sex role identification touches many important domains of behavior, including school work.[8]

Kagan's prediction is that the child will be motivated to develop identification with like-sexed models through his desire to command the attractive goals possessed by the model. This desire for identification with a model should be especially strong for boys because of the predominance of female models in young childrens' lives.[9]

The hypothesis that a program which uses 35 mm slides to present the visual portion will produce better learner performance than a program which uses flat pictures as visuals is based on the proposition that audiovisual

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[8]Jerome Kagan, "Acquisition and Significance of Sex Role Identity," in Review of Child Development Research, ed. by Martin L. Hoffman and Lois Wladis Hoffman (New York: Russell Sage Foundation, 1964), pp. 137-67.

[9]Patrica Sexton, Phi Delta Kappan, 46:133, 1964.

materials attract the attention of the student and motivate more effectively than other materials. This proposition is found in many textbooks in the audiovisual field. Dale cites as proven contributions of audiovisual aids, a high degree of interest and the ability to make learning more permanent.[10] Travers suggests that the increased attention-attracting ability may be due to the high level of light intensity or other factors related to stimulus intensity. Another suggested possibility is that the child may be "conditioned to attend to audiovisual displays since they may be associated with entertainment both at the movies and on the home television receiver."[11]

The visual presentation mode as 35 mm slides or flat pictures, the audio presentation mode as male or female narrator and the student characteristics of sex and readiness have been included in this study in an attempt to discover learner characteristics and presentation modes which may be of value in the design of audiovisual teaching materials.

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[10]Edgar Dale, Audio-Visual Methods in Teaching (New York: The Dryden Press, 1954), p. 65.

[11]Robert M. W. Travers and others, Research and Theory Related to Audiovisual Information Transmission (U.S. Department of Health, Education and Welfare, Contract No. 3-20-003; revised edition, Kalamazoo, Michigan: Western Michigan University bookstore, 1967), p. 5.

Overview

In Chapter II a more detailed examination of the major variables considered in this study is presented. Chapter III presents the design of the study including a discussion of the experimental sample, procedures, instruments and statistical analysis. Chapter IV includes the analysis of the relationships among the variables of presentation mode, learner characteristics, achievement and attitudes. The specific hypotheses are also presented in Chapter IV. The summary, conclusions, discussion of results and implications for further research are presented in Chapter V.

CHAPTER II

REVIEW OF THE LITERATURE

This chapter presents a review of the literature which is divided into three areas: (1) selected papers and studies dealing with the use of multi-media packages in individualized instruction; (2) theoretical and empirical studies that deal directly with, (a) sex role identity, and (b) the attention attracting qualities of projected visual material.

Individualized Instruction

Interest in individualizing instruction by providing different learning experiences for students with differences in background, ability, and other characteristics has increased in recent years. For example, Gagne in emphasizing that we need to know how individual differences interact with educational treatments, states that there are as many varieties of learning as there are distinguishable conditions of learning. These varieties may be differentiated by means of descriptions of the factors that comprise the learning conditions in each case. In searching for and identifying these, the capabilities

internal to the learner and the stimulus situation outside the learner must be identified. Each type of learning starts from a different point of internal capability and is likely also to demand a different external situation in order to take place effectively.[1]

Bolvin states that individualization of instruction has been defined as the use of information about individual differences to prescribe appropriate educational environments. Since one of the requirements for individualizing instruction is a variety of instructional approaches and materials, the role of media in providing this variety cannot be over-emphasized.[2] Without the availability of materials designed to meet the needs of individual students the only alternative is group instruction or tutoring.

The introduction of media technology into the classroom as an aid to individualized instruction will demand more of the teacher in terms of education, experience, and management techniques.

Teachers will also need to have a strong background in learning theory and communication so they will be able

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[1]R. M. Gagne, Learning and Individual Differences (Columbus, Ohio: Charles E. Merrill Publishing Company, 1967), p. 22.

[2]John O. Bolvin and Lindvall C. Mauritz, One Approach to the Problem of Individual Differences (Learning Research and Development Work Paper No. 8, Pittsburg: School of Education, University of Pittsburg, 1966), p. 7.

to deal with the diversity of student characteristics within every classroom. These competencies are necessary because individualized instruction requires that the abilities and requirements of each student must be considered in planning his overall program of instruction and each of its component parts. These abilities and requirements must be specified in terms of entry level behaviors, with regard to the student's weaknesses and strengths. The characteristics of each student play a major role in the selection of objectives, the sequence of study, and the choice of materials and procedures.

The problems which teachers must be concerned with when dealing with individual differences is emphasized by Briggs:

> Individual differences in rate of learning are marked, although the reasons for the different rates are difficult to identify. It is therefore difficult to know which variables in instruction other than rate of presentation need to be modified for certain individuals. One view is that the same media program can be used for all students by simply permitting the student to proceed at his own rate. An alternate view is that there are qualitative differences among students in their "learning styles," so that different kinds of stimuli are needed as to the most important respects in which instructional procedures need to be adapted to the individual learner.[3]

The systems model of teaching offers the teacher and designer of individualized learning materials an

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[3]L. J. Briggs, et al., Instructional Media: A Procedure for the Design of Multi-Media Instructional A Critical Review of Research and Suggestions for Future Research (Palo Alto: American Institute for Research, 1967), p. 18.

uncomplicated, accurate conceptualization of the teaching process.[4]

The basic components of a systems model as described by Glaser are:

1. Analysis of the stimulus characteristics of the subject matter content or the instructional objectives.
2. Diagnosis of the characteristics of the students entry behavior.
3. Designing and carrying out the instructional procedures that lead to a state of subject matter competence.
4. Assessing the learning outcomes.[5]

This study is concerned with two aspects of the systems model, namely, students entry characteristics and the design of instructional procedures.

Sex Role Identity

The concept of sex role identity refers to one component of a complex interlocking set of beliefs the individual holds about himself. The complete set of attitudes is generally regarded as self-concept. The portion of self-concept known as sex role identity refers

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[4]John P. De Cecco, The Psychology of Learning and Instruction: Educational Psychology (Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1964), p. 1-83.

[5]Robert Glaser, "Psychological Bases for Instructional Design," AV Communication Review, 14:433-50, 1966.

to the degree to which an individual regards himself as masculine or feminine.[6]

An individual's desire for establishing a sex role identity is acquired through three processes: (1) identification with models who possess the cluster, (2) expectation of affection and acceptance for possession of the trait cluster, and (3) expectation that possession of the cluster will prevent social rejection.[7]

By the time a child is seven he is intensely committed to modeling his behavior in concordance with cultural standards appropriate to his biological sex and he shows uneasiness, anxiety, and even anger when he is in danger of behaving in ways regarded as characteristic of the opposite sex.[8]

Perception of similarity to parents is one of the major determinants of sex role identity for the young child. "The child who perceives major elements of similarity to the parent of the same sex will initially regard himself as masculine (or feminine), for the parents are the original prototypes of masculinity and femininity for the young child."[9] When the child enters school he comes

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[6]Jerome Kagan, "Acquisition and Significance of Sex Typing and Sex Role Identity," in Review of Child Development Research, ed. by Martin L. Hoffman and Lois Wladis Hoffman (New York: Russell Sage Foundation, 1964), p. 144.

[7]Ibid. [8]Ibid., pp. 146-147. [9]Ibid., p. 145.

into direct contact with peers and other adults who serve as models for sex role identity. As a result of interactions outside of the immediate family the child is forced to accommodate his definition of maleness and femaleness to the value of this broader community.

A review of the literature by Kagan[10] has shown that there are at least three factors which contribute to the individual's feelings of masculinity or femininity: identification with a like-sexed parent, acquisition of the traits which define sex type behavior, and perception that others regard the individual as masculine or feminine.

"An identification is a belief that some of the attributes of a model belong to the self."[11] A child must perceive some bases of similarity between himself and the model, and the model must be perceived as being in command of desired goals such as task competence, love from others or power.[12] In effect, the child behaves as if he believes that objects that appear alike on the outside have similar properties on the inside, and that the greater the external similarity between himself and a model, the greater

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[10] Ibid., p. 146.

[11] Jerome Kagan, "The Concept of Identification," Psychological Review, 65:296, 1958.

[12] Ibid., pp. 296-305.

the possibility he will possess the model's power, competence, and affection.

Parental reward of sex appropriate behavior and punishment of inappropriate behavior facilitates the adoption of sex typed traits. Children feel that their parents want them to adopt sex role attributes.[13] Most parents punish aggression and open sexuality more consistently in daughters than in sons, they punish passivity, dependence, and open display of fear more consistently in sons than in daughters.[14]

In lower class families the children typically adopt sex-typed traits earlier in their development and with greater consistency. This class difference is accounted for by the fact that parents of the lower-class are more concerned with traditional sex typing than middle-class parents.[15]

One of the reasons why the relation between tutor and learner is important is that some tutors elicit

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[13] L. B. Fauls and D. W. Smith, "Sex Role Learning in Five-Year Olds," Journal of Genetic Psychology, 89:105-117, 1956.

[14] R. R. Sears, et al., Patterns of Child Rearing (Evanston, Illinois: Row, Peterson, 1957), p. 123.

[15] M. Rabban, "Sex-role Identification in Young Children in Two Diverse Social Groups," Genetic Psychological Monograph, 42:81-153, 1950.

greater attention than others. They are more distinctive. Those who contend that learning will be facilitated if the child is identified with or wants to identify with a tutor believe that one of the bases for the facilitation is the greater attention that is directed at a model with whom the child wishes to identify. Simply stated an individual will attend more closely to an initial stranger with whom he feels he shares attributes than to a stranger with whom he feels he does not share attributes.[16]

Modeling or imitation has long been recognized as an effective mode of learning new behaviors and attitudes. Although modeling is sometimes conceived simply as learning selected segments of behavior, some relationships foster the modeling process by more intense interpersonal involvement at least on the part of the imitator. He may consciously wish to be like the model and he will tend to perceive himself like the model. Kagan[17] emphasized the perception of similarity as a motive for modeling when a parent is the model, but Freud implied that it was a more general characteristic. Commenting on identification in this general sense, he wrote that "It (identification) may arise with every new perception of a common quality shared with some other person who is not an object of the sexual

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[16]Jerome Kagan, "On the Need for Relativism," American Psychologist, 22:131-42, 1967.

[17]Kagan, Sex Role Identity, op. cit., pp. 137-67.

instinct."[18] The perception of similarity to a model is a behavioral manifestation of the modeling process.

It is usually conceded that parents are the most significant early models and that modeling after one's parent, particularly the same sex parent, is important in psychological development. The tendency to value positively and imitate self-like objects tends to radiate out in the child's development in the form of imitation and liking for the same-sex parent. The boy's preferential attachment to the father as against the mother proceeds from, rather than causes, basic sex-role identity and basic tendencies to imitate the father preferentially.[19]

It has been demonstrated, however, that models change with age. Winker[20] and Havighurst, et al.,[21] in separate studies asked youngsters whom they would "like to be like." Although the age sequence was not rigid, the general choice moved outward from the family circle.

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[18]Sigmund Freud, Group Psychology and the Analysis of the Ego (New York: Bani and Liverwright, 1922), p. 65.

[19]Laurence Kohlberg and Edward Zigler, "The Impact of Cognitive Maturity on the Development of Sex-Role Attitudes In the Years 4 to 8," Genetic Psychology Monographs, 75:89-165, 1967.

[20]J. B. Winker, "Age Trends and Sex Differences in the Wishes, Identifications, Activities and Fears of Children," Child Development, 20:191-200, 1949.

[21]R. J. Havighurst, et al., "The Development of the Ideal Self in Childhood and Adolescence," Journal of Educational Research, 40:241-57, 1947.

Since the six-year-old boy is striving to develop a masculine sex role identification, he can be expected to resist involvement in feminine situations. It may be that first- and second-grade boys have more difficulty than girls in mastering reading, writing, or arithmetic because the average boy perceives the school atmosphere as excessively feminine.

While the evidence of sex differences in achievement is not conclusive some research has indicated that boys are inferior to girls in scholastic performance in the elementary grades. Gates[22] in a study involving 13,000 pupils found that on the average girls of age 8-11 surpass boys in reading ability at the same age. Wozencraft[23] using a stratified sampling technique found a real sex difference in favor of girls for total groups and for average ability groups in the third- and sixth-grade, when they were tested with the Stanford Achievement Test. At the third-grade level, girls in the total and average groups were superior in all four areas tested. It was concluded that, in general, girls start off at an advantage in school work, but boys tend to catch up as they progress through the school grades.

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[22]Arthur I. Gates, "Sex Differences in Reading Ability," Elementary School Journal, 61:431-34, 1961.

[23]Marian Wozencraft, "Sex Comparisons of Certain Abilities," Journal of Educational Research, 57:21-7, 1963.

Parsley, et al.,[24] analyzed results of the California Achievement Test Battery administered to an entire school population, grades four-eight, and found that significant sex differences did exist within three achievement levels for various I.Q. groups. In general, the results indicated that girls excelled in reading achievement and in arithmetic fundamentals, whereas boys tended to excel in arithmetic reasoning.

In school, teachers often find that girls excel in mental and educational achievement. Nearly two-thirds of all grade repeaters are boys, more boys than girls are underachievers and poor readers, and three times as many boys as girls develop stuttering problems.[25] A considerably higher failure rate for boys was found in grades one and two in a National Education Association study of 532 school districts.[26]

Although there are no significant differences in intelligence between the sexes which would help to explain

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[24]Kenneth M. Parsley, et al., "Further Investigation of Sex Differences in Achievement of Under-, Average-, and Over-Achieving Students Within Five I.Q. Groups in Grades Four Through Eight," Journal of Educational Research, 57:268-70, 1964.

[25]Gary L. Peltier, "Sex Differences in the School Problem and Proposed Solution," Phi Delta Kappan, November, 1968, p. 182.

[26]Pupil Promotion Policies and Rates of Promotion (Washington, D.C.: NEA, AASA, Educational Research Service Study, Circular No. 5, 1958).

the success of girls in school,[27] there are several, psychological, and institutional factors which may hinder the male student.

Access to appropriate adult identification models and opportunities for playing portions of their sex roles tend to favor girls. In the family, girls often have more opportunities to interact with their mothers than boys do with their fathers. The pattern is about the same in the school. For boys, the most accessible adult models, such as mothers and teachers, are often inappropriate. One sociologist states that:

> The "femalization" of the nation's schools . . . goes beyond the fact that the majority of teachers are women. The entire tone of the school as a social institution, including the content and scope of the curriculum and the behavior expected of students, suggests a female culture in which many boys cannot function without emotional conflict.[28]

Kagan,[29] in an ingenious experiment, found that second-grade children view common objects in the classroom (blackboards, book, page of arithmetic, school desk) as more clearly associated with feminity than with masculinity.

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[27]Willis W. Clark, "Boys and Girls: Are There Significant Ability and Achievement Differences?" Phi Delta Kappan, 41:73-76, 1959.

[28]Patrica Sexton, Phi Delta Kappan, November, 1964, p. 133.

[29]Jerome Kagan, "The Child's Sex Role Classification of School Objects," Child Development, 35:1051-56, 1964.

The emphasis on conformity to feminine standards of behavior, the frequent punishment of boys for disobedience, aggressiveness, and lack of attention, the tests constructed by women teachers stressing female types of conceptualization, and the almost exclusive staffing of libraries and classrooms with women teachers create a climate which confronts the boy with hostility and lack of understanding.[30]

To counteract the feminine classroom atmosphere, some educational researchers have recommended the employment of a larger number of men as teachers, guidance counselors, school psychologists, and curriculum coordinators in the elementary and high school systems. Men are needed to provide appropriate role models, particularly in schools where the divorce rate is high or where many families are fatherless. Grambs and Waetjen[31] advocate male teacher-researchers for elementary schools so that the men could avoid the usual female stereotype of the elementary teacher.

It has been demonstrated that the sex of experimenters does interact differentially with the sex of the

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[30]Josef E. Garai and Amram Scheinfeld, "Sex Differences in Mental and Behavioral Traits," Genetic Psychology Monographs, 77:169-299, 1968.

[31]Jean D. Grambs and Walter B. Waetjen, "Being Equally Different: A New Right For Boys and Girls," The National Elementary Principal, 46:59-67, 1966.

subjects. In a review of the research, Garai[32] states that, "Female subjects frequently react differently to male than to female experimenters, and male subjects to female than to male experimenters."

Sex of subject by sex of examiner interaction effects were apparent in studies of social influence, operant conditioning, dependency, attention seeking, aggression, problem solving, decision making and scholastic achievement.[33] Rosenblith[34] suggests that possibly the young child, relatively "deprived" of interaction with men, responds with more strength to the male experimentor. Sears[35] also noted that male experimenters and models appear in some cases to produce more effect than women.

Studies in several other areas have shown that there are interactions between children and adults based on sex roles. MacCoby and Wilson[36] report that in two

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[32]Garai and Scheinfeld, op. cit., p. 171.

[33]Garai and Scheinfeld, op. cit., pp. 169-299.

[34]Judy F. Rosenblith, "Learning by Imitation in Kindergarten Children," Child Development, 30:69-80, 1959.

[35]Pauline S. Sears and Edith M. Dowley, "Research on Teaching in The Nursery School," in Handbook of Research on Teaching, ed. by N. L. Gage (Chicago: Rand McNally & Co., 1963), pp. 814-64.

[36]Eleanor E. MacCoby and William C. Wilson, "Identification and Observation Learning From Films," Journal of Abnormal Social Psychology, 55:76-87, 1957.

studies in which entertainment films were shown to grade school children, the viewers identified themselves with like-sexed leading characters. Bandura[37] investigated the occurence of aggression through imitation of adult models. Imitation was found to be differentially influenced by the sex of the model, with boys showing more aggression than girls following exposure to the aggressive male model.

Finally, Stevenson, et al.,[38] used films of adults to study the influence of several variables on children's preferences for adults. The variables were sex of the adult, sex of the child, and the child's age and socio-economic class. Films of men and women portraying the role of either a supportive or neutral reinforcing agent were shown to 1,930 middle- and lower-class elementary school children. Regardless of their age, sex or social class, the children chose a same-sex adult with a high frequency when the pairs of men and women played either a supportive or a neutral role.

Prominent in the literature is the conclusion that elementary children are influenced by like-sexed adults. The desire to establish a sex role identification touches many important areas of behavior, including school work.

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[37]A. Bandura, "Transmission of Aggression Through Imitation of Aggressive Models," Journal of Abnormal Social Psychology, 63:575-82, 1961.

[38]Harold W. Stevenson, et al., "Determinants of Children's Preferences For Adults," Child Development, 38:1-14, 1967.

Individualized instruction offers the opportunity of introducing male or female models into the classroom through the use of a tape recorded narrator who is the opposite sex of the teacher. Male narrators may be particularly beneficial to boys from lower class or broken families.

Attention

The proposition that audiovisual materials attract the attention of the pupil and motivate more effectively than other materials is found in many of the textbooks in the audiovisual field.

In a review of the research on audiovisual information transmission Travers suggests several possible reasons for the attention attracting quality of these projected visual displays:

> Factors related to stimulus intensity may sometimes be the reason for the high attention-attracting quality of such displays. It is quite evident that movies and film strips provide a high level of light intensity and the colors used generally have a higher level of saturation than those that are typically found in nature. . . . Other factors may also operate to command the attention of the pupil. One of these is the possibility that the child has been conditioned to attend to audio-visual displays since these are associated with entertainment both at the movies and on the home television. Whatever conditioning takes place to attend to such displays may well carry over to formal learning situations in which similar displays are used. The conditioning of attention presents an interesting

> area of research which should yield important information for the design and use of audiovisual teaching devices.[39]

Attention is a term that has many meanings in psychological research. William James, one of the first modern experimental psychologists, developed a description of attention to which modern work can add surprisingly little:

> Everyone knows what attention is. It is the taking possession by the mind, in clear and vivid form, of one out of what seem several simultaneously possible objects or trains of thought. Focalization, concentration, of consciousness are of its essence. It implies withdrawal from some things in order to deal effectively with others, and is a condition which has a real opposite in the confused, dazed, scatterbrained state which in French is called distraction. . . .[40]

Blum and Adcock describe the diverse nature of the present research dealing with the concept of attention in the following quote:

> Attention has been an important focus since the beginning of formalized psychology. Such a concept can be thought of as part of any number of areas--curiosity, perception, learning, arousal, or motivation. Thus, although there is a growing body of research on attention and the related concepts of arousal and vigilance, there exists no real theoretical area of specialization from which research emanates. Rather, there exists a variety of approaches and

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[39]Robert M. W. Travers, Research and Theory Related to Audiovisual Information Transmission (U.S. Department of Health, Education, and Welfare, Contract No. 3-20-003; revised edition, Kalamazoo, Michigan: Western Michigan University Bookstore, 1967), p. 17.

[40]William James, Principals of Psychology, Vol. I (New York: Henry Holt and Co., 1890), pp. 403-04.

> conceptualizations all encompassed under the rubric "attention."[41]

It seems evident that a definition and theory of attention will depend, to a great extent, upon the phase of the process being examined.[42] The remainder of this review will be concerned with the meanings of attention which appear to be of highest relevance to the proposition that projected visual materials attract the attention of the pupil and motivate effectively. These factors are stimulus intensity and conditioning to attend.

Stimulus Intensity

After reviewing a number of research studies, Hull advanced a concept he called stimulus intensity dynamism. "Several experimental situations have been found which seem to indicate rather clearly the reaction potential is in part a function of the stimulus intensity involved."[43] Berlyne cites stimulus intensity, motivation, novelty, and curiosity as determinants of attention.[44]

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[41]Abraham Blum and Carolyn Adcock, "Attention and Early Learning A Selected Review," Journal of Education, 151:28, 1968.

[42]Travers, op. cit., p. 226.

[43]Clark L. Hull, "Stimulus Intensity Dynamism (V) and Stimulus Generalization," The Psychological Review, 56:76, 1949.

[44]D. E. Berlyne, "Attention to Change," British Journal of Psychology, 42:269-78, 1951.

Stimulus intensity may act as an aid to learning by focusing the students attention on learning materials. If attention is elicited, curiosity may be generated and a host of investigatory behaviors may occur.

> A minimum condition for receiving information from a picture is that the person involved attend to it. The attending response seems to have two main components. First there is what Russian psychologists have referred to as the orienting response. This, in itself, is quite a complex response, but its primary function is probably that of clearing the information input system so that it can receive new information, much as one clears the registers of a calculator before beginning to work on a new problem. A second phase of the attending response involves the reception and interpretation of new information.[45]

Hendrickson and Muehl conclude that attention in and of itself can bring about learning. Using attention and motor responses, with correct answers being reinforced by the sound of a bell, they taught kindergarten children to differentiate between "b" and "d," assessed by performance on a paired associate transfer task. Those children who learned not only to attend to the direction the letter "pointed" but who also were required to push a lever in that direction were slightly better, overall, although non-significantly, on the transfer task than were those youngsters who attended to direction but who had to make inconsistent motor responses--that is, sometimes they were required to push the lever in the direction the letter

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[45]Robert M. W. Travers and Victor Alvarado, "The Design of Pictures for Teaching Children in Elementary School," AV Communication Review, 18:47-64, 1970.

pointed, sometimes they were to push it in the opposite direction. Although the latter group's performance was more accurate than that of the controls, the attention and consistent motor response group's performance was far superior to that of the controls.[46]

Leboutet conducted a series of experiments designed to compare the perception of still pictures (photographs) viewed close up and pictures projected on a screen. The research was carried out on pupils between the ages of nine and thirteen. The first experiment used thirty-two girls and thirty-two boys as subjects. One half of the boys and one half of the girls were given eight pictures to examine, the other subjects were shown the same eight pictures by projection. With pictures nine through sixteen, the method of presentation was reversed. The pictures selected were photographs of landscapes or scenes familiar to the children. The children were directed to write on a sheet of paper everything that was seen in each picture. The analysis shows in all cases children observed more details from direct examination of a photograph than from projection on a screen and that girls noted more details than boys. The mode of presentation had a significant influence

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[46]Lois N. Hendrickson and S. Muehl, "The Effect of Attention and Motor Response Pretraining of Learning to Discriminate b and d in Kindergarten Children," Journal of Educational Psychology, 53:236-41, 1962.

and shows that the perception of an image on the screen differs from the perception of the same image viewed close at hand. There was an interaction between sex and mode of presentation and between mode of presentation and image content. It was concluded that responses on the whole tend to be more unified with projected images than with photographs and that children's attention is also concentrated more on the same details. The researchers felt that image luminance may have accounted for the difference between the two methods and replicated the experiment using a special condition of equal luminance in all cases. Under the special condition of equal luminance the number of details observed were no longer significant. What was studied were the laws of visual perception in relation to the intensity of the stimulus. If the use of slide projections accounts for different perceptions than flat pictures there may be important educational implications, but further study is needed to show the areas of possible use.[47]

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[47]L. Leboutet, "Etude Comparative de la Perception du Positif Sur Papier et de L'image Fixe Projetee Sur Ecran," Revue Internationale de Filmologie, Vol. 4, No. 1-2, 1953, pp. 39-52, translated and presented in G. Mialaret, The Psychology of the Use of Audio-Visual Aids in Primary Education (Great Britian: George G. Harrays, 1966), pp. 71-80.

Conditioning to Attend

The conditioning of attention is described by Travers:

> By "conditioning" attention is meant an individual may be first taught to attend to certain stimuli, and once the attending process has been learned, these particular stimuli will be attended to more readily than the others, and be capable of holding attention more successfully.[48]

The possibility that children are conditioned to attend to audiovisual displays by viewing television at home and going to see films is well illustrated in a research summary by Travers.

> . . . the fact that attention can be conditioned is a fact with important implications for learning in school. The teacher as well as the designer of audiovisual materials can take advantage of the fact that children approach learning situations with dispositions to attend to certain sources of information rather than to others. One suspects that children in the American culture have been conditioned to attend to television screens long before they reach the elementary schools. This conditioning would give them a predisposition to attend to such screens. In addition, even if the school televised broadcasts were dull and tended to extinguish the attention of the children, some reconditioning would occur each evening when the children returned to their homes. Ultimately, one presumes, that the children would learn to discriminate between those television screens to be attended to and those to be ignored. The film has, of course, also acquired positive value for the child through his out-of-school experiences.[49]

The ability of audiovisual materials to provide reinforcement is well known. Television offers the

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[48]Travers, op. cit., p. 234.

[49]Travers, op. cit., pp. 251-52.

satisfaction of being "in the know," of going behind the scenes and of learning about the world of people. It offers constant change, excitement, and suspense. It provides escape from everyday demands with glamor and romance and permits the child to identify himself with different heroes. "It is television more than any other channel, that builds the 'set' with which a child approaches the mass media. All other media choices are judged against what he has come to expect of television."[50]

Finally, Schramm in commenting on the pertinence of non-school television suggests that there may be important implications for those in the media field:

> Any experience that commands so large a part of a child's time, absorbs and involves him so deeply, and leads him to identify as much as he does, must play some part in shaping the kind of child who comes to school: his interests, the breadth of his world, his status figures, his vocabulary, his ability to learn from pictures and the spoken word, and his capacity for being interested or bored.[51]

The conditioning of attention which takes place is related to film and television both of which use a high intensity light source to project pictures on a screen.

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[50]Wilber Schramm, Television in the Lives of Our Children (Stanford, California: Stanford University Press, 1961), p. 27.

[51]Wilber Schramm, "Television in the Life of The Child Implications for the School," New Teaching Aids for the American Classroom (Stanford, California: The Institute for Communication Research, 1960), p. 50.

The conditioning which takes place is assumed to be a generalized response of attending to a visual display projected on a screen.

Conclusions

The literature in the following three areas is reviewed in Chapter II: individualized instruction, sex role identity, and attention. The following general generalizations are based on the literature review.

In order for individualized instruction to be successful the characteristics of the students must be considered in relation to the subject matter content of the lesson and the educational treatment to be applied. Dealing effectively with these variables is a demanding task for the teacher and one which may require information about students and media which is not presently available.

A systems model was suggested for use in the design of individualized instruction because it provides both an uncomplicated and accurate conceptualization of the teaching process. The systems model is divided into the following components: instructional objectives, entry behavior, instructional procedures and performance assessment.

By the time a child enters first grade he has established a concept of sex appropriate behavior. The child's sex role identity is established through identification with like-sexed models, expectations of social

acceptance for possession of sex-typed traits, and expectations that possession of masculine or feminine traits will prevent rejection.

Several studies suggested that girls do better in elementary school than boys because of a lack of male models. Several other studies were reviewed which demonstrated that subjects responded better to like-sexed experimenters. Both of these findings suggest that elementary students should respond favorably to a like-sexed narrator in an individualized lesson.

A review of the literature on the attention attracting qualities of projected visual displays has suggested that stimilus intensity and conditioning to attend may be relevant concepts. While it was suggested by several authors that stimilus intensity and conditioning to attend may account for improved learning through projected visual displays no studies were found which applied an empirical test to this proposition.

CHAPTER III

DESIGN OF THE STUDY

This chapter contains a description of the sample, data collection instruments, readiness measure and stimulus materials. The specific procedures, experimental design and data analysis, and research hypotheses are also reported.

The Sample

A sample of sixty-four first graders was selected from a population of all the first graders attending a single public elementary school. The school is located in a lower-middle class racially mixed neighborhood in a midwestern city of about 120,000 people. The population was distributed as follows: 56 per cent white students, 41 per cent black students and 3 per cent Mexican-American students.

The school's population of first graders, consisting of eighty-two students, was divided into four groups for the purposes of this experiment. The median score, which was forty, on the Metropolitan Readiness Test was used to divide the population into two groups and then

each of these groups was divided into male and female segments.

Sixteen subjects were selected from each of the four groups by, simple, nonreplacement, random sampling, and randomly assigned to one of the appropriate experimental treatment groups. Four additional subjects, one from each of the four groups, were selected by the sampling procedure mentioned above. These students served as a replacement group.

Stimilus Materials

The stimilus materials (see Appendix A) used in the experiment met several stringent requirements: the content had to be understandable by the subjects, yet provide sufficient novel information to minimize the effects of prior knowledge, while the range of material had to be broad enough to permit the development of a range of test items.

The curriculum guides used in several school districts were studied in search of content that would meet these criteria. The resulting list which included vowel diagraphs, place value, Dolch words, ordinal numbers, logical reasoning and fractional parts was shown to five first-grade teachers. Each teacher independently gave ordinal numbers a high priority. On the basis of these judgments and because of the availability of materials on

the subject it was decided to develop an audiovisual program on ordinal numbers.

The first-grade mathematics textbooks of several publishers (see Appendix E) were consulted to aid in the development of an outline which could be used as a guide in preparing the ordinal number programs. The outline was then developed into a script by an experienced first-grade teacher who had produced a number of similar audiovisual programs for individualized instruction. The program was designed to meet the following behavioral objectives:

> Given a written ordinal numeral from first through tenth and a sequence of ten pictures the student will be able to mark the picture corresponding to the numeral.
>
> Given a sequence of up to ten pictures in a row from left to right, in which one picture has been marked, and two ordinal numerals, the student will be able to recognize and mark the ordinal numeral which corresponds to the marked picture.
>
> Given a printed sheet containing a sequence of ten pictures in a row from left to right the student will be able to mark the item in the sequence which corresponds to the orally given position of that item from first through tenth.

After the initial script was developed and a preliminary version of the program was assembled, a tryout-revise-tryout method was used to refine the program. The first version was shown to three experienced first-grade teachers whose observations provided a basis for modifications in the narration, visual material and work sheets. The revised program was then tried out again. The second trial involved having eight first grade students, two boys

and two girls with a readiness score below forty, and two boys and two girls with a score above seventy go through the program individually while the experimenter kept a record of their comments and noted the parts of the program which were confusing to the subjects. The program was revised again and final changes were made to develop or simplify material found to be difficult by the subjects.

Two different methods of presenting the visual material were used in the experiment: projected 35 mm slides and flat pictures. Both male and female narrators were used with each of the visual treatments.

Visual

All of the visuals used in the experiment (see Appendix A) were black and white line drawings approximately three-fourth inch and one and one-half inch high. A master copy of the visuals for the flat visual version of the program was used to make copies on a 3M 209 copy machine for use in the experiment. The master copy was also used to produce the 35 mm slide version. A Nikkon F camera with a Micro-Nikkor lens, 3400K photoflood lights and Kodak, Kodachrome II Professional film were used in producing the slides.

The flat pictures were bound in a booklet with Thomas plastic bindings and the slides were projected with a Kodak 850 Carousel slide projector using a three inch lens. The slides were projected on a white cardboard

screen. The size of the figures projected on the screen and the size of the figures in the flat picture version were the same.

Audio

The male and female narrators were selected by means of a voice rating scale (see Appendix C) developed for this study. The rating scale was comprised of five sub-scales which were: sense of communication, pleasantness of pitch, pronunciation, voice variation, speaking rate and a general effectiveness scale. Five experienced first- and second-grade teachers (see Appendix C) were asked to rate three male and three female speakers on each of the six scales. The narrators were not known by the raters and the raters were hearing the voices for the first time. For a summary of the ratings given the six narrators see Appendix C.

Selected textbooks in speech and communications were consulted to determine the qualities of an effective voice. The following quotation is typical of the descriptions of good speaking voice in these textbooks.

> A good speaking voice is both pleasant to listen to and effective as a medium of communication. A pleasant voice is one that makes a favorable impression upon anyone that notices it--as, for example, a relative stranger whose reactions are not predetermined by past acquaintance. An effective voice is

> one having tonal qualities that reinforce with accuracy and vividness the speaker's intended meaning.[1]

The voice qualities used on the rating scale represent those most frequently found in the textbooks consulted. The scales which were used on the rating form were adopted from a listener's response chart and a voice criticism chart suggested by Oliver and Cortright.[2]

Teachers were used to evaluate the narrators because of their familiarity with the preferences of the subjects. As Fessenden pointed out, people will differ in their evaluation of speakers depending on the situation, news commentators, comedians and teachers will be evaluated on differing criteria.[3]

After the narrators were selected a recording of the lesson was made. All recording was done with a Sony F-98 cardioid microphone, a Sony 350 tape recorder and an Acoustic Research amplifier. The recordings for use with the 35 mm slide visuals were done first and used as masters. Two copies were made from each of the masters for use in the experiment.

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[1]Carl B. Cass, A Manner of Speaking For Effective Communication (New York: G. P. Putnam's Books, 1961), p. 93.

[2]Robert T. Oliver and Rupert L. Cortright, Effective Speech (4th ed.; New York: Holt, Rinehart Winston, 1965), pp. 91-96.

[3]Seth A. Fressenden and others, Speech For the Creative Teacher (Dubuque, Iowa: Wm. C. Brown Co., 1968), p. 56.

At the beginning of each lesson directions were given to the subjects explaining how to advance to a new visual. In the 35 mm slide version the subjects were instructed to "push the green button," and in the flat picture version to "turn the page," each time they heard a tone. To insure all of the tapes would be as close to identical as possible the narrators were asked to make a recording of the directions for the flat picture version. These directions were then substituted for the slide advancing directions by splicing them into one of the copies of the recording.

Instrumentation

Attitude

The attitude test (see Appendix B) consisted of ten items. Each item contained three drawings representing a happy face, a neutral face and a sad face. For each of the ten items a statement was read to the student and he was instructed to mark the face which best illustrated how he felt about the statement. The face to which each item was keyed was scored as three points, a neutral face two points and the remaining face one point. Thus for the ten items there was a possible total of thirty points.

The test was developed by an experienced first-grade teacher and then revised on the basis of suggestions made by a member of Michigan State University's Educational

Research Department experienced in attitude test development. After the initial test was developed it was further refined by the tryout-revise-tryout procedure used with the stimulus materials.

The reliability of the scores on the attitude test was calculated using the Hoyt's Analysis of Variance procedure. This procedure provides an estimate between the obtained variance and the true variance that is more accurate than that obtained by an arbitrary division of the test into two halves or into other fractional parts.[4] The results are presented in Table 3.1.

TABLE 3.1.--Internal Reliability Analysis of the Attitude Test.

Source	Sum of Squares	d.f.	Mean Square	Reliability
Individuals	91.548	63	1.453	.6581
Items	6.983	9	.776	
Error	281.717	567	4.968	
TOTAL	380.238	639		

[4]Robert L. Ebel, "Estimation of the Reliability of Ratings," Psychometrika, 16:407-24, 1951.

Achievement

The achievement test (see Appendix B) consisted of nine items. The test was designed to measure the subjects achievement as specified in the behavioral objectives for which the stimulus material were designed. There were three test items for each of the three objectives. The directions and test items were submitted along with the learning material to the tryout-revise-tryout cycle.

A reliability analysis using the Hoyt[5] procedure was performed on the achievement test and the results are reported in Table 3.2. For the purpose of data analysis the subject's score on the test was determined by the number wrong and ranged from zero to nine. There was a correlation of .51 between the achievement and attitude tests.

TABLE 3.2.--Internal Reliability Analysis of the Achievement Test.

Source	Sum of Squares	d.f.	Mean Square	Reliability
Individuals	30.1597	63	.4787	.6668
Items	24.9305	8	3.1163	
Error	80.4028	504	.1595	
TOTAL	135.4930	575		

[5] Ibid.

Readiness

Form A of the Metropolitan Readiness Test (MRT) was used to assess the subjects readiness. The MRT was designed to measure the extent to which school beginners have developed in the several skills and abilities that contribute to readiness for first grade instruction. The test is divided into six parts: (1) word meaning, (2) listening, (3) matching, (4) alphabet, (5) numbers, and (6) copying. The six subtests yield a total score with reported reliabilities estimates which range from r = .91 to r = .94.[6]

The authors of the MRT report a correlation of .76 with the Pintner-Cunningham Primary Mental Ability Test and a correlation of .80 with the Murphy-Durrell Reading Readiness Analysis.

The MRT was administered in May, 1969, by the pupil's own teachers following the recommendations of the test developers. The experimental population had a range of test scores from 7 to 95 with a median of 40 and a mean of 44.64.

Procedure

The stimulus materials were presented to the subjects in two segments, the first segment lasting

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[6]Gertrude H. Hildreth and others, Metropolitan Readiness Tests a Manual of Directions (Harcourt, Brace and World, 1965), p. 14.

twenty minutes and the second fifteen minutes. The two segments were presented to the subjects on consecutive days.

The experiment was conducted in a room on the third floor of the school which had been reserved for that purpose. The room was equipped with eight carrels which were arranged in two groups of four each. The carrels were made by attaching heavyweight cardboard to the tops of tables which were in the room. Once the subjects were seated, the carrels prevented them from viewing each other.

Four of the carrels were equipped with Kodak Carousel slide projectors for presenting the visual material and copies of the bound flat visuals were placed in the remaining four carrels. A single tape recorder and a junction box with four earphones were used to supply the narration to each group of four carrels. Thus eight subjects at a time could participate in the experiment. During each session the entire group of eight subjects heard either a male or a female narrator while half of the group viewed the visual portion as flat pictures and the other half viewed slides. Each group consisted of a mixture of male and female subjects.

An explanation of the purpose of the experiment and the procedures to be followed was given to the three first-grade teachers involved. At the same time a schedule showing student names and times of participation was also

given to each teacher. Third-grade students met each group of students at their classroom on the first floor and conducted them to the experimental room on the third floor. The third-graders also returned the subjects to their rooms at the end of each session.

Each group of subjects was given a brief explanation of the experiment and the procedures to be followed. The experimenter demonstrated the use of the earphones and allowed a short time for the subjects to adjust them. The methods for advancing to the next visual were also explained.

The achievement test and attitude tests were administered by the experimenter after the completion of the second lesson. The subjects remained in the carrels during the administration of the test to prevent them from observing the answer sheets of other subjects.

Design and Analysis

The design of the study and the treatments are summarized in the illustration on the following page.

The effects of the instructional treatments and the learner characteristics of sex and readiness were analysed with a four way analysis of variance. A fixed effects analysis for equal cell frequencies was used. Two separate analyses were performed, the first utilized scores on the subject matter achievement test as the dependent variable and the second utilized scores on the

		V_m		V_f	
		S_m	S_f	S_m	S_f
L_1	T_1				
	T_2				
L_2	T_1				
	T_2				

Legend

L_1 - Subjects scoring above the median on the Metropolitan Readiness Test.

L_2 - Subjects scoring below the median on the Metropolitan Readiness Test.

T_1 - Visual presentation mode as flat pictures.

T_2 - Visual presentation mode as 35 mm slides.

V_m - Male narrator

V_f - Female narrator

S_m - Male subject

S_f - Female subject

attitude test as the dependent measure. An alpha level of .10 was selected for rejecting the null hypothesis. The .10 level was used because: (1) the attitude test reliability of .66 and the achievement test reliability of .67 increased the difficulty of finding differences, (2) there has been little previous research on the hypothesis, (3) the number of subjects in the experimental treatment groups was small, and (4) the subjects were exposed to the treatments for a relatively short period of time.

A post-test only design without a control group was used because the study was designed to test hypotheses concerning which of several treatments produced the greater effects rather than whether the treatments were more effective than no treatment at all.

The data were punched on computer cards and analyzed at the Michigan State University Computer Center. A Control Data Corporation 3600 digital computer was used in the analysis.

Statistical Hypotheses

To evaluate the effectiveness of male and female narrators, flat pictures as visuals, 35 mm slides as visuals and subject's readiness level in relation to an audiovisual lesson, six statistical hypotheses were generated and tested. Each null hypothesis tested is presented first, followed by an accompanying alternate hypothesis.

Readiness Level:

Null Hypotheses, 1_a. There will be no interaction between the subject's readiness level as measured by the Metropolitan Readiness Test and any other experimental factor when achievement is the dependent variable.

Alternate Hypothesis, 1_a. There will be an interaction between the subject's readiness level as measured by the Metropolitan Readiness Test and the other experimental factors when achievement is the dependent variable.

Null Hypothesis, 1_b. There will be no interaction between the subject's readiness level as measured by the Metropolitan Readiness Test and any other experimental factor when attitude is the dependent variable.

Alternate Hypothesis, 1_b. There will be an interaction between the subject's readiness level as measured by the Metropolitan Readiness Test and the other experimental factors when attitude is the dependent variable.

Sex of the Narrator:

Null Hypothesis, 2_a. There will be no interaction between the sex of the narrator and the sex of the subjects when achievement is the dependent variable.

Alternate Hypothesis, 2_a. The mean scores of subjects who hear a like-sexed narrator will be higher than the mean scores of subjects who hear an opposite-sexed narrator when achievement is the dependent variable.

Null Hypothesis, 2_b. There will be no interaction between the sex of the narrator and the sex of the subjects when attitude is the dependent variable.

Alternate Hypothesis, 2_b. The mean scores of subjects who hear a like-sexed narrator will be higher than the mean scores of subjects who hear an opposite-sexed narrator when attitude is the dependent variable.

Presentation Mode of the Visual Material:

Null Hypothesis, 3_a. There will be no difference between the mean score of subjects who experience the 35 mm slide presentation mode and the subjects who experience the flat picture presentation mode when achievement is the dependent variable.

Alternate Hypothesis, 3_a. The mean score of subjects who experience the 35 mm slide presentation mode will be greater than the mean score of the subjects who experience the flat picture presentation mode when achievement is the dependent variable.

Null Hypothesis, 3_b. There will be no difference between the mean score of subjects who experience the 35 mm slide presentation mode and the subjects who experience the flat picture presentation mode when attitude is the dependent variable.

Alternate Hypothesis, 3_b. The mean score of subjects who experience the 35 mm slide presentation mode will be greater than the mean score of the subjects who experience the flat picture presentation mode when attitude is the dependent variable.

Summary

Sixty-four first-graders were divided into four groups by sex and scores on the Metropolitan Readiness Test. The subjects were then randomly assigned four to a cell to sixteen experimental treatment groups. Each group received an audiovisual lesson designed to test the effectiveness of a particular presentation mode. There were four variations in the presentation mode: (1) male narrator, (2) female narrator, (3) 35 mm slides as visuals, and (4) flat pictures as visuals.

The effect of readiness level, the subject's sex, and the presentation mode were evaluated with achievement and attitude tests. The tests and stimilus materials were developed by the tryout-revise-tryout method after a survey of published materials on ordinal numbers was conducted to provide an outline.

Data collection was conducted in the experimental room immediately after the stimilus materials were presented. A post-test only design was used. The hypotheses were tested using a four way fixed effects procedure for the analysis of variance.

CHAPTER IV

ANALYSIS OF DATA

The statistical hypotheses were tested using a fixed effects model for analysis of variance. Two separate analyses, both having the same design were performed. Scores on a subject matter achievement test, determined as the number wrong, were used as the dependent variable in the first analysis and scores on an attitude test which ranged from a high of thirty for a positive attitude to a low of fourteen were used as the dependent variable in the second analysis. All hypotheses were tested using the .10 alpha level with the appropriate degrees of freedom.

Analysis of Data

The first analysis of variance was performed to evaluate the effects of presentation mode and the learner characteritistics of sex and readiness level on subject matter achievement. A summary of the analysis is reported in Table 4.1. Following the table each of the null hypotheses using achievement as the dependent variable is stated and the related data presented.

TABLE 4.1.--Analysis of Variance Using Achievement Test Scores.

Source	S.S.	d.f.	M.S.	F-Value	Probability
Readiness	97.5156	1	97.5156	30.4439	.0005
Visual Mode	9.7656	1	9.7656	3.0487	.087
Sex	2.6405	1	2.6406	0.8243	.368
Narrator	0.7656	1	0.7656	0.2390	.627
Readiness x Visual Mode	5.6406	1	5.6406	1.7610	.191
Readiness x Sex	0.0156	1	0.0156	0.0049	.945
Readiness x Narrator	0.3906	1	0.3906	0.1219	.728
Visual Mode x Sex	0.0156	1	0.0156	0.0049	.945
Visual Mode x Narrator	0.0156	1	0.0156	0.0049	.945
Sex x Narrator	0.0156	1	0.0156	0.0049	.945
Readiness x Sex x Visual Mode	1.2656	1	1.2656	0.3951	.533
Readiness x Narrator x Visual Mode	0.0156	1	0.0156	0.0049	.945
Visual Mode x Sex x Narrator	0.1406	1	0.1406	0.0439	.835
Readiness x Sex x Narrator	1.2656	1	1.2656	0.3951	.533
Readiness x Narrator x Visual Mode x Sex	0.0156	1	0.0156	0.0049	.945
Error	153.7500	48	3.2031		

Total number of items missed was used in the analysis. The scores ranged from zero missed to nine missed. The means and frequencies for all main effects and interactions are reported in Appendix D.

Readiness Level:

> Null Hypothesis, 1_a. There will be no interaction between the subject's readiness level as measured by the Metropolitan Readiness Test and any other experimental factor when achievement is the dependent variable.
>
> Alternate Hypothesis, 1_a. There will be an interaction between the subject's readiness level as measured by the Metropolitan Readiness Test and the other experimental factors when achievement is the dependent variable.

An analysis of variance which included all the readiness interactions produced the following F-values: readiness visual mode F = 1.7610, readiness x sex F = 0.0049, readiness x narrator F = 0.1219, readiness x sex x visual mode F = 0.3951, readiness x narrator x visual mode F = 0.0049, readiness x sex x narrator F = 0.3951, readiness x narrator x visual mode x sex F = 0.0049.

These F-values are not significant at the .10 level of confidence. Therefore, the null hypothesis cannot be rejected. There were no interactions between readiness level and any other experimental variables.

Sex of the Narrator:

> Null Hypothesis, 2_a. There will be no interaction between the sex of the narrator and the sex of the subjects when achievement is the dependent variable.

Alternate Hypotheses, 2_a. The mean scores of subjects who hear a like-sexed narrator will be higher than the mean scores of subjects who hear an opposite-sexed narrator when achievement is the dependent variable.

The analysis of variance summary for null hypothesis 2_a was presented in Table 4.1 (see page 52). The F-value of .0049 for the narrator and sex interaction was not significant at the .10 level, therefore the null hypothesis cannot be rejected. There was no interaction between male and female narrators, and male and female subjects. The means for the sex and narrator interaction are presented in Table 4.2.

TABLE 4.2.--Means for the Narrator and Sex Interaction with Achievement as the Dependent Variable.

	Male Narrator		Female Narrator	
	N	Mean	N	Mean
Male Subjects	16	3.6870	16	3.3125
Female Subjects	16	3.5000	16	3.0600

Presentation Mode of the Visual Material:

Null Hypothesis, 3_a. There will be no difference between the mean score of subjects who experience the 35 mm slide presentation mode and the subjects who experience the flat picture presentation mode when achievement is the dependent variable.

Alternate Hypothesis, 3_a. The mean score of subjects who experience the 35 mm slide presentation mode will be greater than the mean score of the subjects who experience the flat picture presentation mode when achievement is the dependent variable.

The analysis of variance table on page 52 shows an F-value of 3.0487 for the main effect of visual presentation mode which is significant at the .10 level of confidence, therefore the null hypothesis is rejected. The mean score of subjects who received the 35 mm slide presentation mode was greater than the mean score of the subjects who received the flat picture mode. The means for the presentation mode main effect are presented in Table 4.3.

TABLE 4.3.--Means for the Visual Presentation Mode Main Effect with Achievement as the Dependent Variable.

Mode	N	Mean
35 mm slides	32	3.7812
Flat pictures	32	3.0000

A second analysis of variance was done to evaluate the effects of presentation mode and the learner characteristics of sex and readiness level on the subject's attitude. A summary of the analysis is reported in Table 4.4. Following the table each of the null hypotheses using attitude as the dependent variable is stated and the related data are presented.

TABLE 4.4.--Analysis of Variance Using Attitude Test Scores.

Source	S.S.	d.f.	M.S.	F-Value	Probability
Readiness	13.1406	1	13.1406	0.9145	.344
Visual Mode	40.6406	1	40.6406	2.8282	.099
Sex	5.6406	1	5.6406	0.3925	.543
Narrator	3.5156	1	3.5156	0.2447	.623
Readiness x Visual Mode	1.2656	1	1.2656	0.0881	.768
Readiness x Sex	5.6406	1	5.6406	0.3925	.534
Readiness x Narrator	43.8906	1	43.8906	3.0544	.087
Visual Mode x Sex	15.0156	1	15.0156	1.0449	.312
Visual Mode x Narrator	3.5156	1	3.5156	0.2447	.623
Sex x Narrator	66.0156	1	66.0156	4.5941	.037
Readiness x Sex x Visual Mode	4.5156	1	4.5156	0.3142	.578
Readiness x Narrator x Visual Mode	0.1406	1	0.1406	0.0098	.922
Visual Mode x Sex x Narrator	26.2656	1	26.2656	1.8278	.183
Readiness x Sex x Narrator	1.2656	1	1.2656	0.0881	.768
Readiness x Narrator Visual Mode x Sex	1.2656	1	1.2656	0.0881	.768
Error	689.7500	48	14.3698		

Each of the ten items in the attitude test contained three choices with each choice weighted from one to three. A weight of three was assigned to those responses which signified a positive attitude and a weight of one was assigned to responses which signified a negative attitude. While there was a possible range in the attitude test scores from thirty for a positive attitude to ten for a negative attitude, the actual scores ranged from thirty to fourteen.

Readiness Level:

> Null Hypothesis, 1_b. There will be no interaction between the subject's readiness level as measured by the Metropolitan Readiness Test and any other experimental factor when attitude is the dependent variable.
>
> Alternate Hypothesis, 1_b. There will be an interaction between the subject's readiness level as measured by the Metropolitan Readiness Test and the other experimental factors when attitude is the dependent variable.

An analysis of variance which included all the readiness interactions produced the following F-values: readiness x visual mode F = 0.0881, readiness x sex F = 0.3925, readiness x narrator F = 3.0544, readiness x sex x visual mode F = 0.3142, readiness x narrator x visual mode F = 0.0098, readiness x sex x narrator F = 0.0881, readiness x narrator x visual mode x sex F = 0.0881.

The readiness and narrator interaction was significant at the .10 level of confidence while all of the other interactions were not. With the exception of the

readiness and narrator interaction the null hypothesis cannot be rejected. The readiness and narrator interaction means are presented in Table 4.5.

TABLE 4.5.--Means for the Readiness and Narrator With Attitude as the Dependent Variable.

	Male Narrator		Female Narrator	
	N	Mean	N	Mean
High Readiness	16	25.750	16	23.625
Low Readiness	16	23.187	16	24.375

Sex of the Narrator:

> Null Hypothesis, 2_b. There will be no interaction between the sex of the narrator and the sex of the subjects when achievement is the dependent variable.
>
> Alternate Hypothesis, 2_b. The mean scores of subjects who hear a like-sexed narrator will be higher than the mean scores of subjects who hear an opposite-sexed narrator when attitude is the dependent variable.

The analysis of variance summary for null hypothesis 2_b was presented in Table 4.4 (see page 56). The F-value of 4.5941 for the narrator and sex interaction was significant at the .10 level, therefore the null hypothesis is rejected and the alternate hypothesis is accepted. Male subjects who heard a male narrator had a higher mean score than both male subjects who heard a female narrator and female subjects who heard a male narrator. Female subjects

who heard a female narrator had a higher mean score than both female subjects who heard a male narrator and male subjects who heard a female narrator. The means for the sex and narrator interaction are presented in Table 4.6.

TABLE 4.6.--Means for the Narrator and Sex Interaction with Attitude as the Dependent Variable.

	Male Narrator		Female Narrator	
	N	Mean	N	Mean
Male Subjects	16	25.187	16	22.687
Female Subjects	16	23.750	16	25.312

Presentation Mode of the Visual Material:

Null Hypothesis, 3_b. There will be no differences between the mean score of subjects who experience the 35 mm slide presentation mode and subjects who experience the flat picture presentation mode when attitude is the dependent variable.

Alternate Hypothesis, 3_b. The mean score of subjects who experience the 35 mm slide presentation mode will be greater than the mean score of the subjects who experience the flat picture presentation mode when attitude is the dependent variable.

The analysis of variance table on page 56 shows an F-value of 2.8282 for the main effect of visual presentation mode which is significant at the .10 level of confidence, therefore the null hypothesis is rejected. The mean score of subjects who received the 35 mm slide

presentation mode was greater than the mean score of the subjects who received the flat picture mode. The means for the visual presentation mode main effect are presented in Table 4.7.

TABLE 4.7.--Means for the Visual Presentation Mode Main Effect with Attitude as the Dependent Variable.

Mode	N	Mean
35 mm slides	32	25.031
Flat pictures	32	23.438

Summary

Each hypothesis was tested using an analysis of variance procedure and the .10 level of confidence was used to determine significance. A summary of the results of the statistical analysis is presented in the following table. A discussion of the findings and their implications will be found in Chapter V.

TABLE 4.8.--Summary of Results.

Null Hypotheses	Significant Level	Statement of Rejection or Non-Rejection
1_a. There will be no interaction between the subject's readiness level as measured by the Metropolitan Readiness Test and any other experimental factor when achievement is the dependent variable.	NS*	Non-Rejection
2_a. There will be no interaction between the sex of the narrator and the sex of the subjects when achievement is the dependent variable.	NS	Non-Rejection
3_a. There will be no difference between the mean score of subjects who experience the 35 mm slide presentation mode and the subjects who experience the flat picture presentation mode when achievement is the dependent variable.	S**	Rejection
1_b. There will be no interaction between the subject's readiness level as measured by the Metropolitan Readiness Test and any other experimental factor when attitude is the dependent variable.		
readiness x narrator	S	Rejection
all other interactions	NS	Non-Rejection
2_b. There will be no interaction between the sex of the narrator and the sex of the subjects when attitude is the dependent variable.	S	Rejection

TABLE 4.8.--Cont.

Null Hypotheses	Significant Level	Statement of Rejection or Non-Rejection
3_b. There will be no difference between the mean score of subjects who experience the 35 mm slide presentation mode and the subjects who experience the flat picture presentation mode when attitude is the dependent variable.	S	Rejection

*No significant difference

**Significant at or above the .10 level

CHAPTER V

SUMMARY AND CONCLUSIONS

The purpose of this study was to investigate the relationship between the readiness level and sex of first-grade students and various presentation modes in an individualized audiovisual lesson. The presentation modes investigated were: (1) visual mode as 35 mm slides or flat pictures, and (2) audio mode as male or female narrator.

The generalizations drawn from the review of the literature were that for individualized instruction to be successful the characteristics of the students must be considered in relation to the subject matter content of the lesson and the educational treatment to be employed. In order to predict the effect of male and female narrators on male and female subjects the literature on sex role identity was reviewed. To predict the effect of a comparison between 35 mm slides and flat pictures the literature on attention was reviewed.

The review of the literature on sex role identity indicated that by the time a child enters first-grade he has established a concept of sex appropriate behavior.

The child's sex identity is established through identification with like-sexed models, expectations of social acceptance for possession of sex-typed traits, and expectations that possession of masculine or feminine traits will prevent rejection.

Several studies suggested that girls do better in elementary school than boys because of a lack of male models. Several other studies were reviewed which demonstrated that subjects responded better to like-sexed experimentors. Both of the findings suggested that elementary students should respond favorably to a like-sexed narrator in an individualized lesson.

The review of the literature on the attention attracting qualities of projected visual displays suggested that stimilus intensity and conditioning to attend may be relevant concepts. While it was suggested by several authors that stimulus intensity and conditioning to attend may account for improved learning through projected visual displays no studies were found which applied an empirical test to this proposition.

The experimental population consisted of eighty-two first-grade students from a school in a racially-mixed lower socio-economic neighborhood. The school was located in a midwestern town of approximately 120,000 people. A sample of sixty-four subjects was randomly selected and divided into four groups by sex and the median score on the

Metropolitan Readiness Test. The subjects were then randomly assigned four to a cell to sixteen experimental treatment groups. Each cell received an audiovisual lesson designed to test the effectiveness of a particular combination of audio and visual presentation mode in relation to the subjects readiness level and sex.

A sequence of two lessons on ordinal numbers was developed for use in the experiment. The materials were developed by consulting the mathematics textbooks of several publishers, developing a preliminary program, and then refining it by a tryout-revise-tryout procedure.

The narrators for the audio presentation mode were selected by a panel of five teachers using a rating scale. The male and female narrators used identical scripts and the tape recordings used with the two visual presentation modes were identical with the exception of the directions for advancing to a new visual.

The visuals used in the lesson were all black and white line drawings. The 35 mm slides were made by photographing the flat picture version. When the slides were projected in the experiment the figures were the same size as the figures in the flat picture version. A piece of white cardboard was used as a screen for the slides.

The effects of the presentation mode and learner characteristics were measured with attitude and achievement tests developed for the study. The tryout-revise-tryout

method used on the lesson was also used on the tests. When used in the experiment the attitude test had a reliability of r = .66, and the achievement test a reliability of r = .67. There was a correlation of .51 between the two tests.

The experiment was conducted in a room which had been equipped with eight individual carrels. One group of four carrels was equipped with slide projectors and the other group of four carrels contained copies of the flat visuals. One tape recorder and a junction box with four headsets supplied the sound to each group of four carrels. The subjects participated in the two segments of the lesson on consecutive days. The attitude and achievement tests were given in the carrels, at the end of the second lesson.

The statistical hypotheses were tested using a fixed effects model for analysis of variance. Two separate analyses, both using the same design, were computed. Scores on the achievement test were used in the first analysis and scores on the attitude test were used in the second analysis. All hypotheses were tested using the .10 level of confidence with the appropriate degrees of freedom.

Conclusions

The analysis of the achievement and attitude test scores supports the following conclusions:

1. The students with Metropolitan Readiness Test scores above the population median had higher achievement test scores than students with readiness scores below the median. No relationship was found between student attitudes and scores on the readiness test. With one exception, the students readiness level did not make any difference in the attitude or achievement level of either male or female students who were exposed to a program incorporating any combination of the experimental audio or visual presentation modes. The exception was a readiness and narrator interaction on the attitude test.

2. When achievement test scores were used to measure the effects of male and female narrators there were no differences between the test scores of male or female students who heard either a male or a female narrator. When attitude test scores were used to measure the same interaction the male students who heard a male narrator and the female students who heard a female narrator achieved higher test scores than the students who heard a narrator of the opposite sex. A higher attitude test score signified a more positive attitude.

3. The scores on both the attitude and achievement tests were higher for students who were exposed to the visual material as 35 mm slides than for the students who were exposed to the visuals as flat pictures.

Discussion of Results

The data analysis has indicated that the student characteristic of readiness did account for differences in the achievement level of students, but, had little effect on attitude toward the experimental program. There were no interaction effects between readiness and any of the combinations of presentation modes when achievement was measured and only one interaction (readiness x narrator) when attitude was measured. These results do not support the contention that the characteristic of readiness can be used as a basis for assigning students to any particular combination of the presentation modes studied in this experiment.

The data analysis for hypotheses 2_a and 2_b has indicated that male students prefer a male narrator and female students prefer a female narrator, but there preferences appear not to affect achievement significantly. This finding has important implications for the designers of audiovisual materials, but should be considered in light of the following limitations. The entire experiment and test administration was conducted by a male experimenter, and this may have effected the results of the attitude test. The students were exposed to the stimulus materials over a two day period and the experience was a novel one for the students in several ways, for example, leaving their own classroom, and working with tape recorders and earphones.

The short exposure to the materials and the novelty of the experience may have influenced the results. The experimental population contained a number of students who may have had a less than average opportunity for contact with male models. Several were from broken homes or homes where there was no father. This lack of male models may have influenced the response to a male voice.

The students who experienced the presentation mode which used 35 mm slides as visuals had higher achievement test score and a better attitude toward the experimental lesson than those students who experienced the flat picture presentation mode. These results, added to the fact that a slide projector allows more control over the order and rate of presentation would seem to justify the additional cost of purchasing projectors.

There are several limitations which should be considered in interpreting the results of the findings on the visual presentation mode. The subjects had an opportunity to interact with each other during the week that the experiment was conducted and may have attached a prestige value to being located in a carrel equipped with a slide projector rather than with flat pictures. The short length of the experimental lessons may have been very important because stimulus intensity and conditioning to attend are both effects which may be expected to decrease over time, especially if the materials do not continue to be reinforcing.

Implications for Further Research

The following research suggestions are based on the findings of this study and the experiences and insights gained during the course of the study.

1. The students in this study were exposed to the experimental treatment for twenty minutes the first day and for fifteen minutes the second day. Further studies should be conducted to investigate the effects of the experimental treatment modes over a longer period of time and within the students own classroom. The novelty of the experience may have effected the results of the present study and a longer exposure to individualized audiovisual lessons may lessen the effects.

2. In considering the effects of a tape recorded narrator on student achievement and attitude this study used only one male and one female narrator. There are many variations in the quality of a voice which may effect the student's performance and these qualities may interact with student characteristics. For example black students may prefer a black narrator. This could be tested by either a narrator with a recognizable speech pattern or dialect, or the student could be shown a picture and informed that it was a photograph of the narrator. Another factor which may influence the effect of a narrator is choice. Students who are shown a series of photographs and are allowed to select the narrator that they will hear may

be more highly motivated than those students given no choice.

3. During the course of the experiment some of the students remarked that they liked having their own carrels and working alone while other students said that they would rather work in a group or choose a partner with whom to work. A pattern seemed to emerge in which the students high on the readiness measure preferred to work alone while those who were low on the readiness measure preferred to work with others. Further research should be conducted to validate or reject this observation and to study the effects on student achievement.

4. Replications of this study should be conducted with different populations. The subjects in this experiment were all first-graders and were all from the same neighborhood. There may have been demographic variables that are characteristic of populations from lower class neighborhoods which influenced the findings. For example the educational level of the parents, the occupation of the father, whether there is an adult male living at home, and the ethnic background of the parents are all variables which may have contributed to the present results and are suggested for further study.

5. The students in this experiment were not allowed to choose the rate of the presentation, to back up the tape, nor to go over any visual material which may

have been confusing to them. A study should be conducted to investigate the effects of allowing the student more control over the material. More control could be given by providing the following options: (1) selection of the time for participation, (2) control over the tape recorder, (3) a tape recorder that automatically advances each visual and, also shuts itself off each time a response is required of the student, and is activated again when the response has been made.

6. The findings of the present study are based on a lesson designed to teach the ordinal numerals first through tenth. Further studies need to be conducted to determine the effect of various subject matter and/or types of learning required of the subjects. Gagne's[1] eight conditions of learning or Bloom's[2] Taxonomy of Educational Objectives are suggested as guides in designing the stimulus materials and criterion tests for further studies.

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[1]Robert M. Gagne, The Conditions of Learning (New York: Holt, Rinehart and Winston, 1967), p. 33.

[2]Benjamin S. Bloom, ed. Taxonomy of Educational Objectives Handbook I: Cognitive Domain (New York: David McKay Company, 1956), pp. 1-207.

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APPENDICES

APPENDIX A

STIMULUS MATERIALS

APPENDIX A

SCRIPT FOR EXPERIMENTAL TREATMENT

Explanation: The script shown immediately below was for the printed visual treatment. The script and taperecording for the slide visual treatment was identical with the exception of the directions for advancing to a new visual. This change is shown in parentheses immediately following the directions for the printed visual treatment. The visual portion of the treatment is indicated by a sequence number and is entered by that number following the narrative portion of the script.

LESSON 1

Audio	Visual
Hello! We have some games to play today. There will be some questions in these games and I want you to do your best to find the answers. If you are not sure of the correct answer, you may mark the one you guess is the correct answer. Take your time and try to put down an answer for each game. Each time you hear the bell you will have to push the green button to go ahead. (Each time you hear the bell you will have to turn to the next page of your workbook.)	
Today we are going to look at some pictures that will show different animals in a line or row. You have had to stand in a line many times, haven't you? Do you get in a line when your teacher takes you out to the playground? Do you know any games where everyone must be in one line? Do you ever play follow-the-leader? The leader is the first one in line, isn't he. There is no one in front of him. BELL	

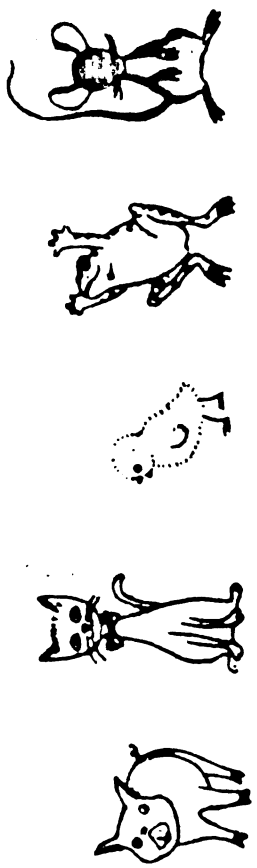
Audio	Visual
Did you remember to press the green button? (Did you remember to turn to the next page in your workbook?) If you didn't please do it now, so that you see five animals in a row. In this picture which animal is the leader? That's right, the pig is the leader. He is first in line. Let's look at the other animals. The next animal is a cat, he is second in line, then there is a chicken, a frog, and finally a mouse. These animals are going to take turns being the leader. Let's watch! BELL	1.1
The first leader was the pig. The word on left is first, say first quietly, first. BELL	1.2
Is the pig still first in line? No, he is not the leader, so he cannot be first. The cat is the leader now, so he is first. The pig is next, so we say that he is second in line. See the word second under the pig? Say the word with me quietly, second. Now look at the answer sheet on your desk. In box number one put an X on the animal that is second in line. Do it now, I will wait for you. BELL	1.3
I hope you made an X on the pig, the pig is the second animal in the line. BELL	1.4
The animals have a new leader now, who is first now? That's right the chicken is first. Do you know which animal is second? Is the pig still second? No, you are right, the pig is third. Say third with me, third. Do you see the word third written under the pig? It begins like the word three doesn't it? Look at box number two on your workbook, put an X on the animal that is third. BELL	1.5
Did you put an X on the pig? Good! The pig is the third animal in line. BELL	1.6
In this game the animals have another leader, and look where the pig is! He is the fourth animal in line. Can you see the word four in fourth? They begin the same don't they. Now look at box three on your worksheet, can you make an X on the fourth animal? BELL	1.7

Audio	Visual
Does your paper look like this? Good! The pig is fourth. Let's do the next game. BELL	1.8
Where is the pig now? Thats right, he is the last one, or he is the fifth one in line. Say the word quietly, fifth. Look at your worksheet in box four put an X on the animal that is fifth in line. I will wait for you. BELL	1.9
I hope you put the X on the pig. It is the fifth animal in the line. In the next game I am going to let you work by yourselves. I will tell you which animal to mark, and the word that tells which one to mark will be written at the left, for you. Let's begin. BELL	1.10
Put an X on the first animal. Use box five on your worksheet for this game. BELL	1.11
Does your worksheet look like this? Good! The frog is first in line. Let's do the next game. BELL	1.12
Now we are looking for the animal that is second in line. In box six on your paper make an X on the animal that is second. BELL	1.13
I hope you put an X on the pig. It is second in line. Let's go on. BELL	1.14
Can you find the animal that is third in line. Mark the third animal in box seven on your worksheet. BELL	1.15
The cat is the third animal in the line. Did you put an X on it? Great! BELL	1.16
In the next game we want to find the fourth animal in line. Use box eight on your paper to put an X on the fourth animal. BELL	1.17
Does your paper look like this? Good! The frog is the fourth in line. BELL	1.18
Now let's look for the animal that is fifth in line. In box nine on your worksheet mark the fifth animal with an X. BELL	1.19

Audio	Visual
Did you mark the last animal in the line? Good for you. There are five animals in line so the last one is the fifth. BELL	1.20
Now we are going to look at some lines of animals there will be ten animals in each line. There will be a number written beside each line of animals. I will read that numeral to you and ask you to make an X on the animal that the numeral names. First let's look at a line of chickens. Listen very carefully. Put your finger on the first chicken. Now move your finger to the second chicken, now third, fourth, and now put your finger on the fifth chicken. Good! But we are only in the middle of the line. Listen as I tell you the names for the rest of the chickens in line. After fifth comes sixth, seventh, eighth, ninth and finally tenth. Let's do one of these games. BELL	1.21
The numeral at the left is sixth say it quietly, sixth. Now, I want you to put your finger on the first chicken and count it as one, move your finger along until you count six, do this in box ten on your worksheet. Now use your crayon to make an X on that chick. BELL	1.22
Good! I hope your paper looks like this. Let's do the next one. BELL	1.23
Look at the word at the left. It says seventh. Can you find the word seven in seventh? Count the mice until you get to seven. In box eleven on your paper put an X on the seventh mouse. BELL	1.24
Does your paper look like this? Good! BELL	1.25
Look at all of the frogs! We're looking for the eighth frog. Put your finger on the first frog in box twelve on your worksheet, now count to eight, put an X on that frog, he is the eighth frog in the line. BELL	1.26
That's very good now let's go ahead. BELL	1.27
Now we are looking for the ninth cat. Count from the left until you get to nine. Use box thirteen on your worksheet for this game. Make an X on that cat. BELL	1.28

Audio	Visual
Good! Let's do the last game for today. BELL	1.29
Here are ten pigs the last one is the tenth pig. In box fourteen put an X on the tenth pig. BELL	1.30
I hope your paper looks like this.	1.31
You have been a very good worker today. When my voice stops take off your earphones and put them on the table in front of you. Goodby!	

Visual 1.1



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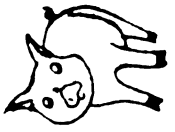


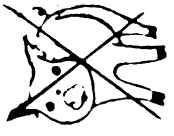
first

Visual 1.3

Visual 1.4

Visual 1.5

Visual 1.6



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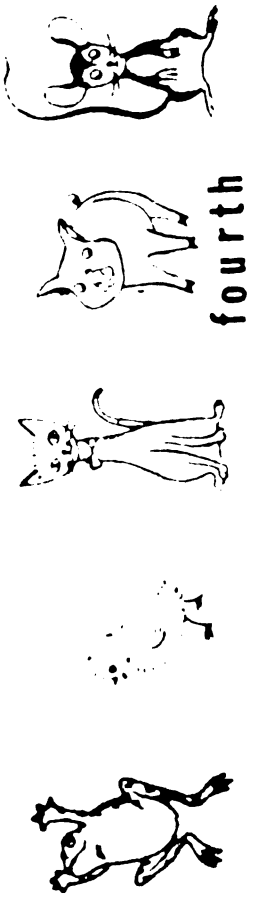

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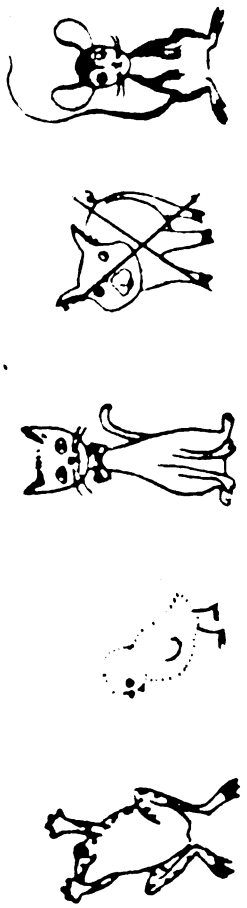


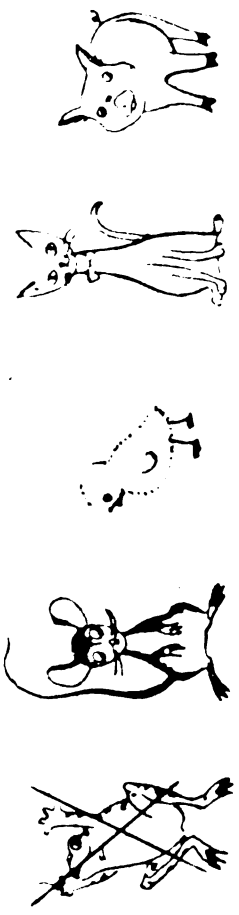
Visual 1.9

Visual 1.10

Visual 1.11

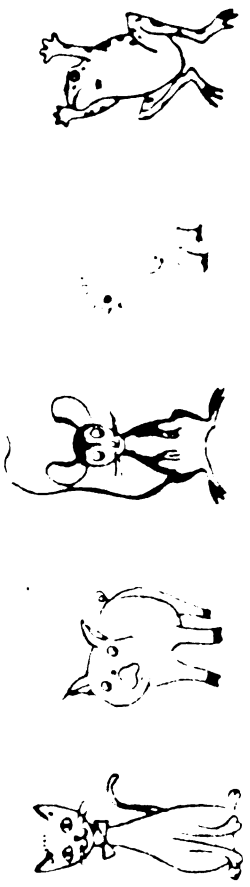
first

Visual 1.12



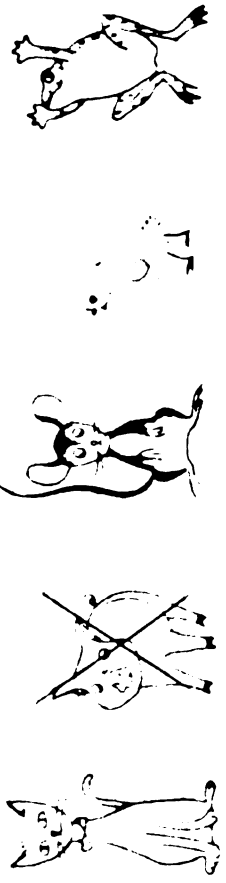
first

Visual 1.13



second

Visual 1.14

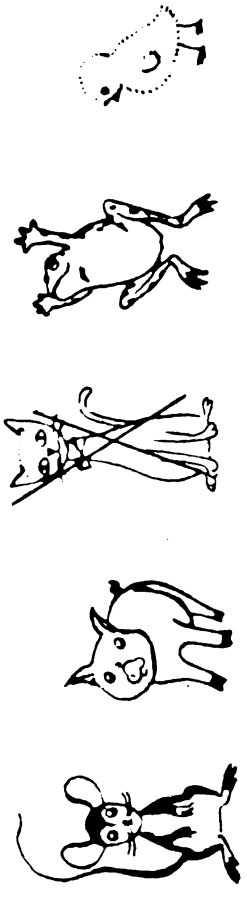


second

Visual 1.15

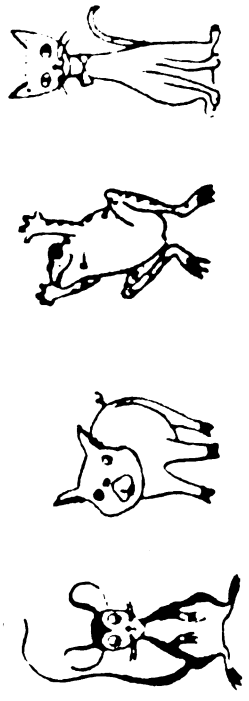
third

Visual 1.16



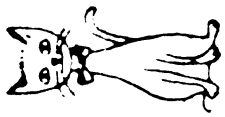
third

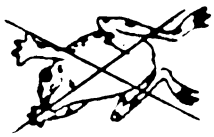
Visual 1.17



fourth

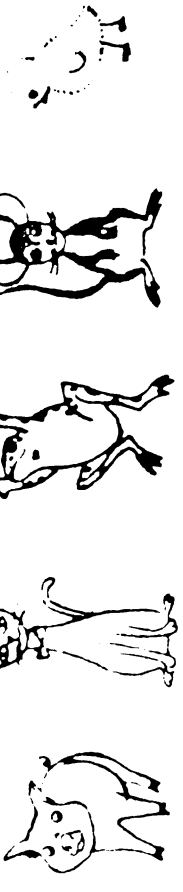
Visual 1.18





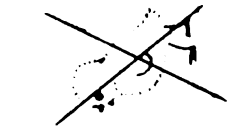
fourth

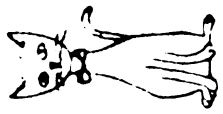
Visual 1.19



fifth

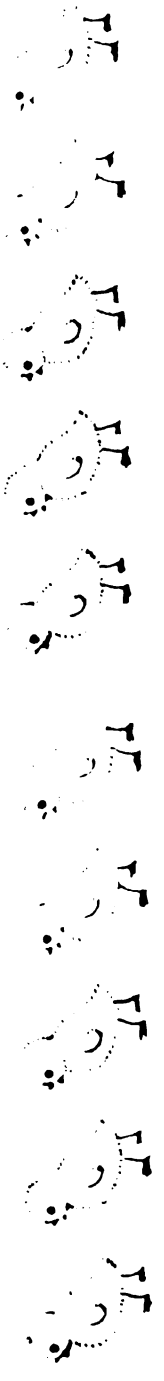
Visual 1.20





fifth

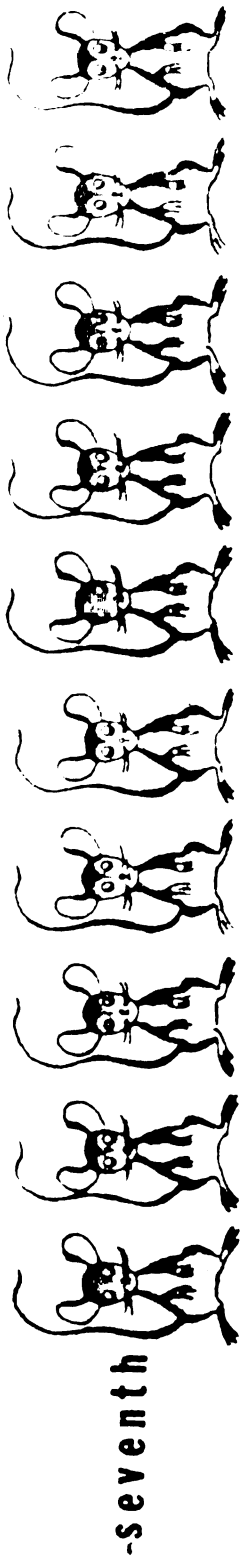
Visual 1.21



Visual 1.22

Visual 1.23

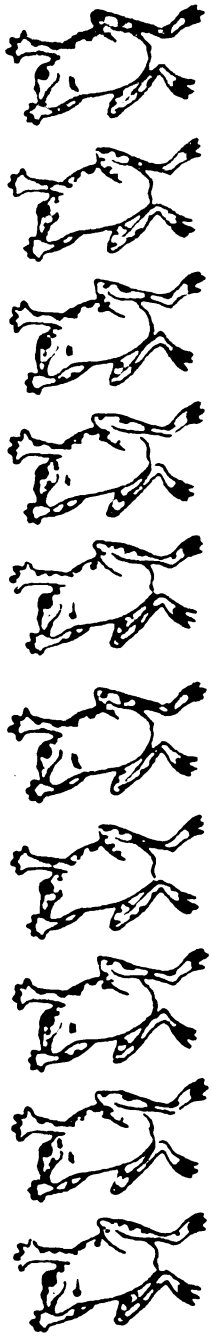
Visual 1.24



Visual 1.25

seventh

Visual 1.26



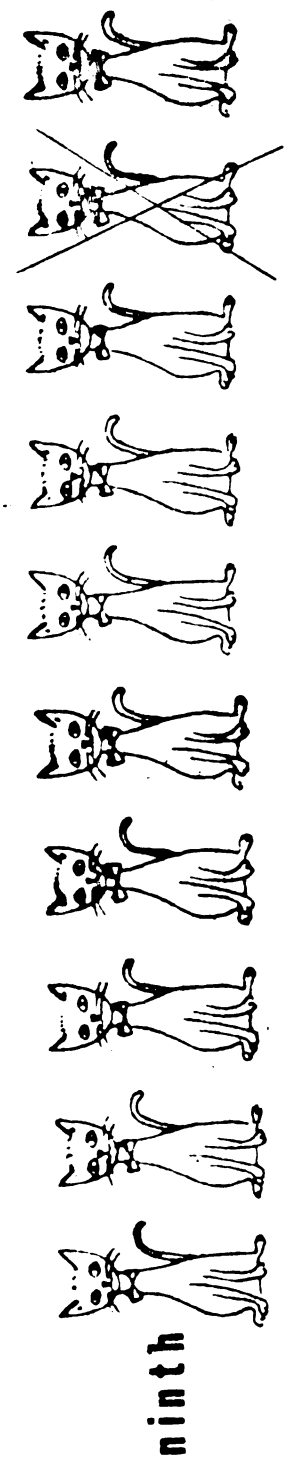
eighth

Visual 1.27

eighth

Visual 1.28

Visual 1.29



Visual 1.30

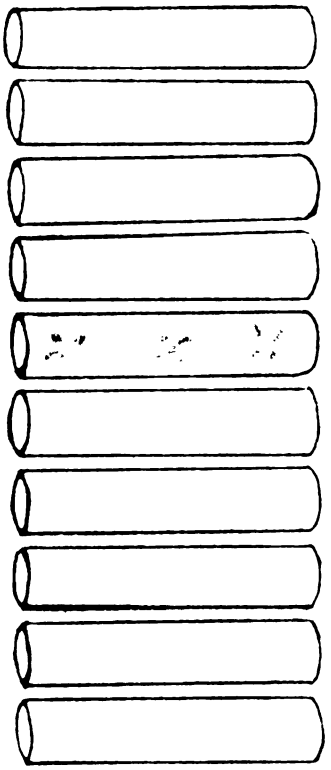
Visual 1.31

LESSON 2

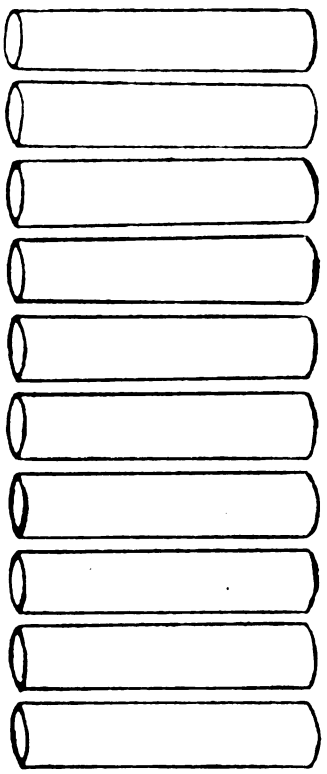
Audio	Visual
Hi! Today we are going to visit a candy store. Have you ever been to a candy store before? When we walk in we see all kinds of candy and each different kind is in its own box. Each candy looks and tastes different. BELL	
Did you push the green button (turn to the next next page)? If you did then you can see the candy! But look at the candy in this store! It all looks alike, how will we help the store keeper put them away? We will have to use our crayons to make the candies look different from each other. Listen very carefully so that you will know just what to do to each candy stick. In box one on your worksheet use your red crayon to make red stripes on the first candy stick. BELL	2.1
Well if you made your paper look like this, we can put one candy stick away for the store keeper. Can you use your green crayon to color the ninth stick in box two green. BELL	2.2
If you made the ninth stick green, and your paper looks like this the store keeper can put another candy away. Good. Now, take your blue crayon and in box three on your worksheet make three blue flowers on the sixth stick. BELL	2.3
Good! You certainly are a big help to the candy store man. Does your sixth stick have three blue flowers on it like this one? BELL	2.4
In the next game look at the candy sticks. You will have to read the word at the left and then color that candy stick orange. Use box four for this game. BELL	2.5
Does box four on your worksheet look like this? Good! BELL	2.6
In the next game the candy stick has already been colored, but the store keeper does not know where to put this candy. You can help him by first reading the two words next to the candy sticks and then drawing a circle around the word that will tell him where to put it. You will know which word to circle because you can look at the candy and tell	2.7

Audio	Visual
if it belongs in the sixth or tenth box. In box five on your worksheet circle the word that tells. BELL	
I hope you circled tenth like this. BELL	2.8
Now the candy man tells us that two of the candy sticks must look just alike. The fourth and eighth candy sticks should have brown stripes. Use your brown crayon to make stripes on the fourth and eighth candy sticks in box six on your worksheet. BELL	2.9
Aren't they pretty now? Did you remember which sticks were in fourth and eighth place? Great! BELL	2.10
In box number seven on your worksheet read the word at the left and color the top half yellow and the bottom half green of that stick. BELL	2.11
Did you color the second stick like this one? It looks like it should taste like a lemon on one end and like a lime on the other doesn't it. Now the candy man wants an all lemon stick can you look at box number eight on your worksheet and make the fifth stick all yellow? BELL	2.12
Your paper should look like this. Great! Now let's do one last thing to help the candy man clean up. BELL	2.13
The candy man has a red candy stick, but he can't remember if it goes in the third box or the ninth box. Help him remember by circling the right word in box nine on your worksheet. BELL	2.14
I hope you circled the word third. The red candy is third, isn't it?	2.15
Thank you for playing these games with me. You have been a very good worker. When my voice stops, you may take off your earphones, and put them on the table in front of you. Goodby!	

Visual 2.4

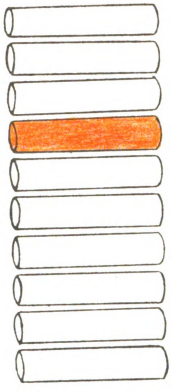


Visual 2.5



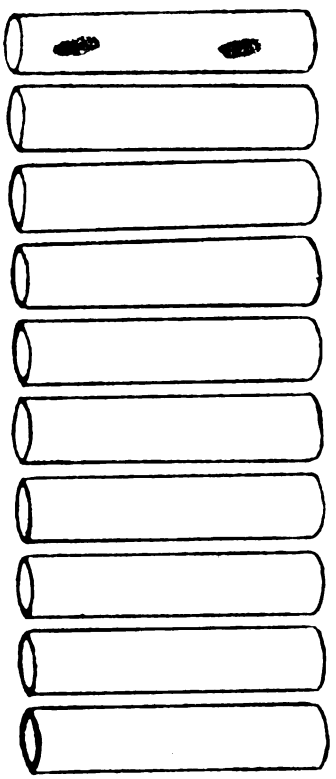
- seventh

Visual 2.6



seventh

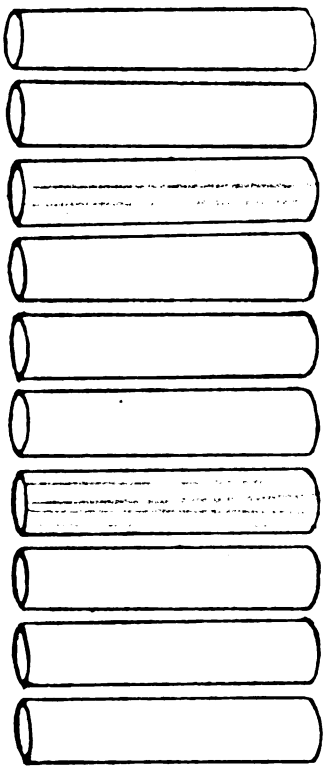
Visual 2.7



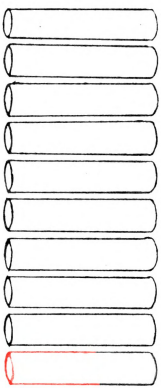
sixth

tenth

Visual 2.10

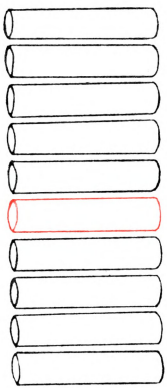


Visual 2.12

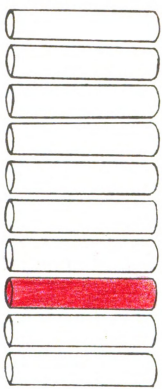


second

Visual 2.13



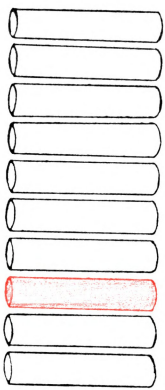
Visual 2.14



third

ninth

Visual 2.15



third

ninth

LESSON 1

WORKSHEET

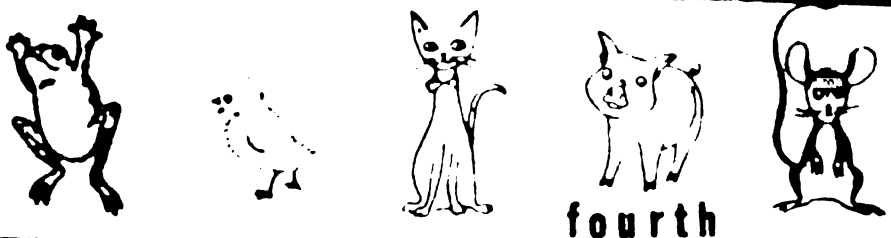
1

second

2

third

3



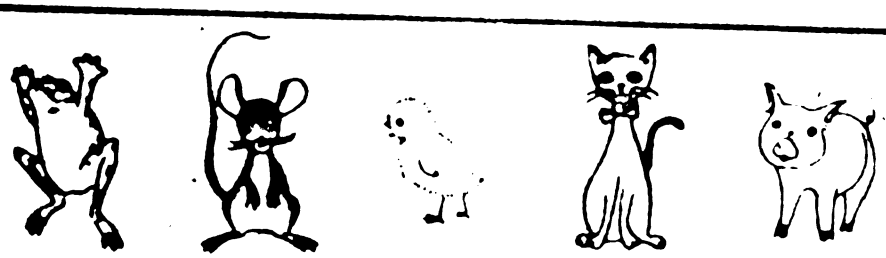
fourth

4

fifth

5

first



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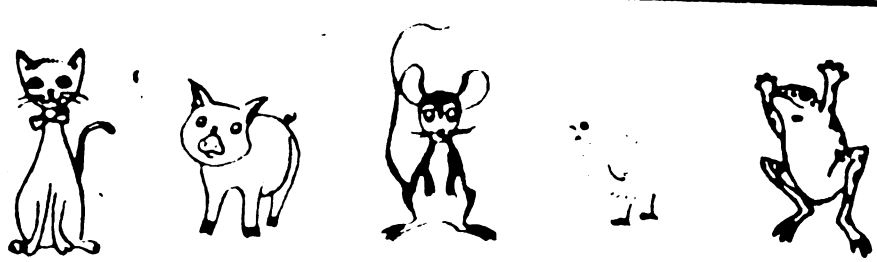

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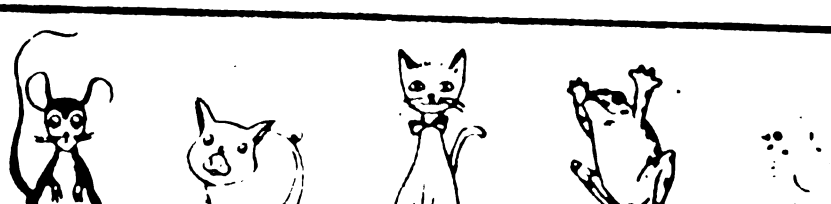
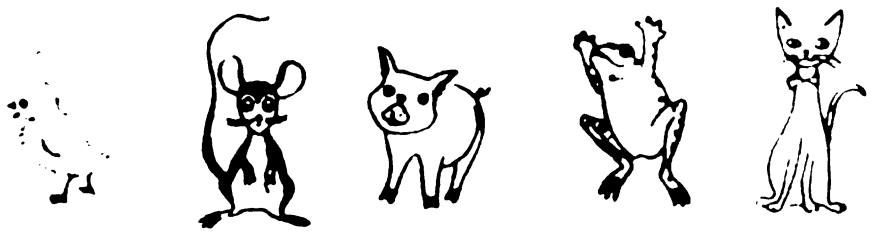


WORKSHEET

LESSON 1

fourth



fifth

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sixth

11

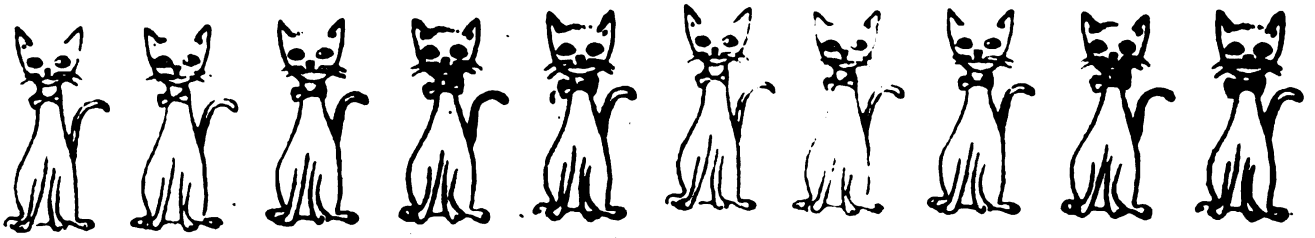
seventh

12

eighth

13

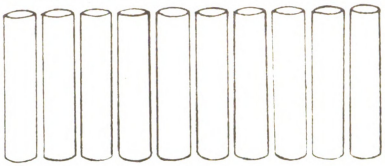
ninth



14

tenth

6



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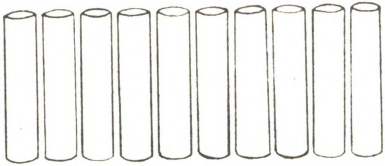

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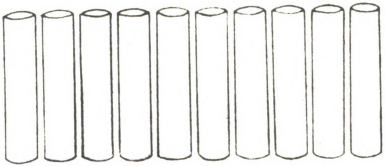

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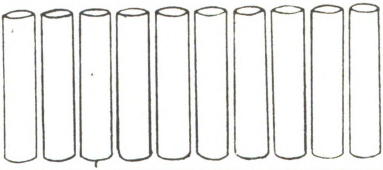

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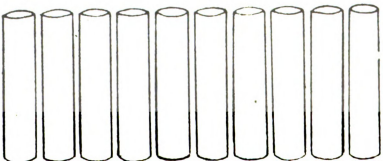
third

ninth



APPENDIX B

ATTITUDE AND ACHIEVEMENT TESTS

ATTITUDE TEST

DIRECTIONS

I am going to ask you some questions about the lessons you have just done. To answer these questions you will have to make an X on a face. If you mark the smiling face it means you would feel happy, if you mark the sad face it will mean that you would feel sad, if you mark the straight face it means you don't know how you would feel.

Listen carefully to each question before marking any face.

1. In box 1 mark the face that shows how you would feel if you could have this kind of lesson every day.

2. In box 2 mark the face that shows how you would feel about not having the same teacher talk to you if you could have more lessons like this.

3. In box 3 mark the face that shows how you would feel if you could have your reading or science lessons taught this way.

4. In box 4 mark the face that shows how you felt about working by yourself today.

5. In box 5 mark the face that shows how you liked the voice that was on the tape today.

6. In box 6 mark the face that shows how you would feel if your teacher said you could never have this kind of lesson again.

7. In box 7 mark the face that shows how you felt about the teacher that gave this lesson.

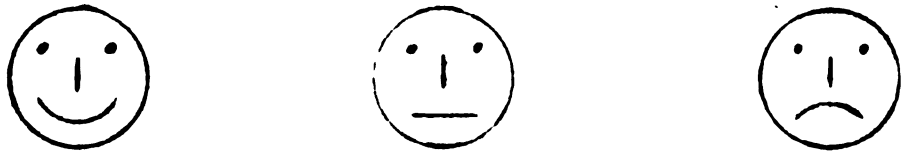
8. In box 8 mark the face that shows how you would feel if you could work by yourself more often.

9a. In box 9 mark the face that shows how you would feel about having a woman teacher give you the lesson.

9b. In box 9 mark the face that shows how you would feel about having a man teacher give you the lesson.

10. In box 10 mark the face that shows how you would feel about school if more of your lessons were taught this way.

NAME _____

1 

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10			
11			

PERFORMANCE TEST

DIRECTIONS

Before you leave today, I would like to see how much you have learned about the names we use to tell where something is in a line. There will be nine games - listen very carefully as I tell you what to do in each game. Let's look at the first game.

1. There are ten cats in a line. Read the numeral at the left and use your crayon to make an X on that cat. I will wait for you.

2. Now look at game number two. Do you remember the candy sticks? Is the X on the sixth or the ninth stick? Circle the word that tells where the X is.

3. In game number three there are ten mice. Use your crayon to make an X on the second mouse in the line.

4. In the next game you see five children in costumes. Which child has the X? Circle the word that tells.

5. Here are the candy sticks again this time use your crayon to color the fourth candy stick. Now turn to page two for the rest of the games.

6. First you must read the word at the left, and then

use your crayon to make an X on the child that is in that place in the line.

7. In game number 7 read the two words at the left, then count the pigs until you come to the pig with the X on it. Use your crayon to circle the word that tells which pig has the X.

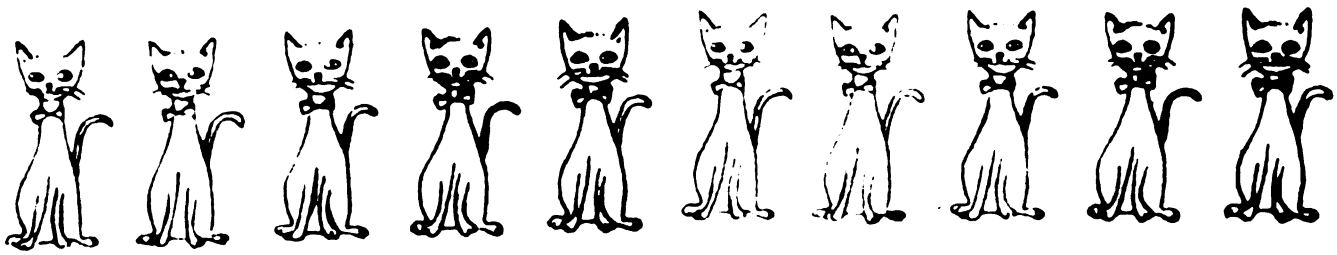
8. In this game I want you to count the children until you get to the eight one. Make an X on the eight child.

9. Let's do the last game, you need to read the word and then color that candy stick.

TEST

1

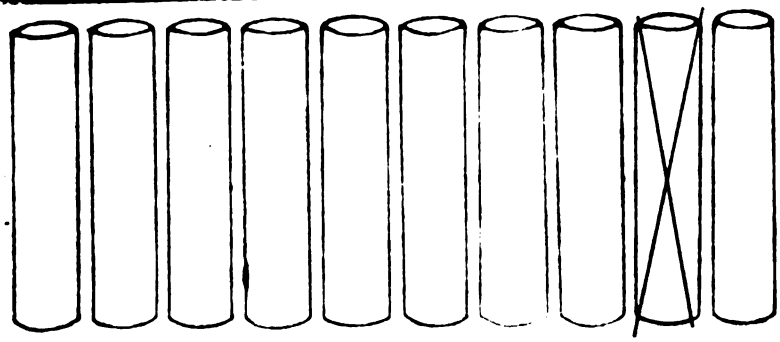
sixth



2

sixth

ninth

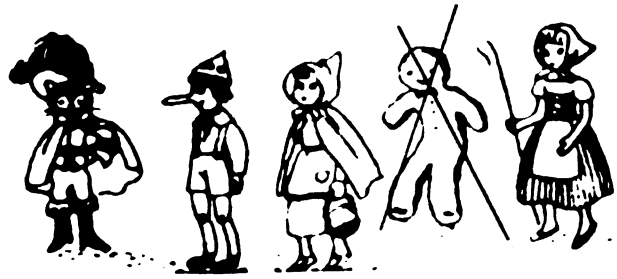


3

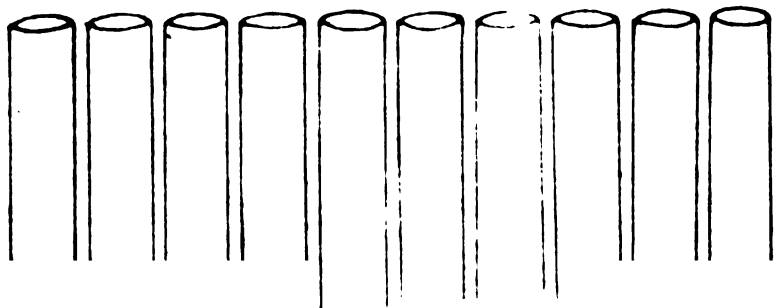
4

fourth

first

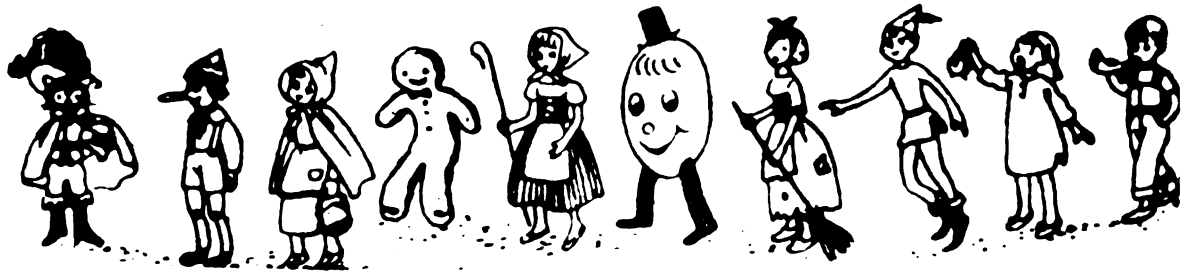


5



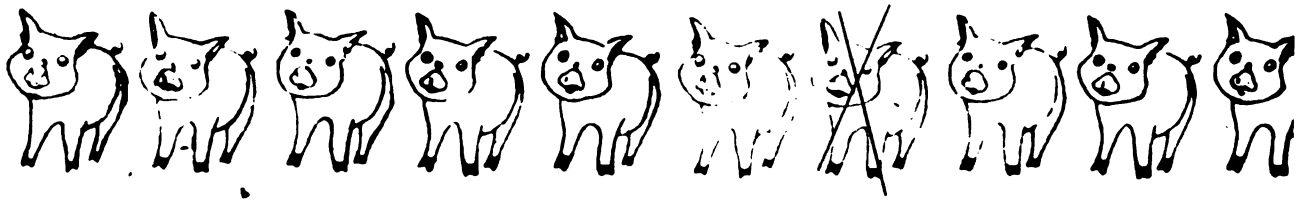
6

fifth

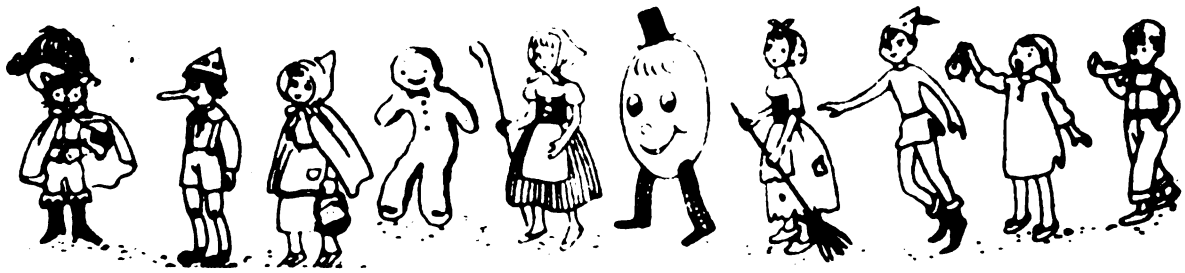


7

fourth
seventh

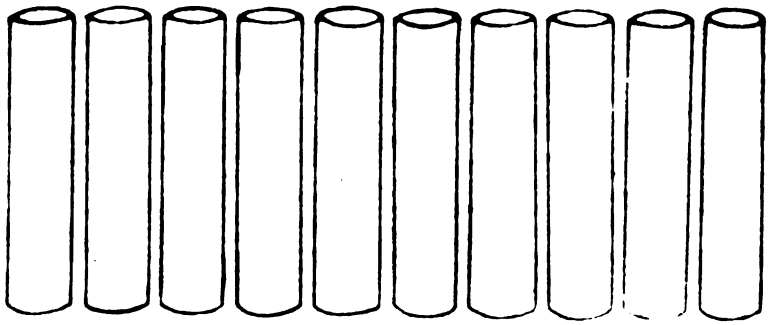


8



9

third



APPENDIX C

VOICE RATING INSTRUMENT AND RESULTS OF THE RATING

DIRECTIONS FOR VOICE RATING SCALE

I would like your help in choosing a person to narrate a tape-recorded sequence of individualized lessons to be used by first grade pupils.

You will hear different people read the same paragraph which has been taken from one of the lessons. After each person has finished reading, I will stop the tape and ask you to rate the voice you have heard on the sheets that I have given you.

Before we start I will give a brief explanation of the rating sheets. You will be asked to rate each speakers voice on the following five characteristics.

Sense of Communication: The speakers voice gives an impression of such personal traits as sympathy, friendliness, and warmth.

Pleasantness of Pitch: The speakers voice will probably make a favorable impression on the student who hears it.

Pronunciation: Each word is easily understood and accurate.

Voice Variation: The speakers voice shows enthusiasm, and is not monotonous.

Speaking Rate: The speaker maintains a rate which will keep interest up without being so fast that the student will be confused.

General Effectiveness: Give an over all rating of the acceptability of the voice.

Rate each speakers voice by placing an X over the number which you feel indicates the degree to which the speakers voice possesses that Characteristic.

1 poor
2 average
3 good

First you will hear three female voices. I will stop the tape recorder after each voice so that you will have time to complete the rating of that voice. When you have rated three female voices you will be asked to do the same thing for three male voices. There will be two versions of each lesson one using a male voice and the other using a female voice. Are there any questions?

NAME_____

VOICE RATING SCALE

DIRECTIONS: Please rate each speakers voice by placing an X over the number which you feel indicates the degree to which the speakers voice possesses that characteristic. Please mark every one.

1 poor
2 average
3 good

FEMALE VOICE 1

1 2 3 Sense of Communication

1 2 3 Pleasantness of Pitch

1 2 3 Pronunciation

1 2 3 Voice Variation

1 2 3 Speaking Rate

1 2 3 General Effectiveness

FEMALE VOICE 2

1 2 3 Sense of Communication

1 2 3 Pleasantness of Pitch

1 2 3 Pronunciation

1 2 3 Voice Variation

1 2 3 Speaking Rate

1 2 3 General Effectiveness

FEMALE VOICE 3

1 2 3 Sense of Communication

1 2 3 Pleasantness of Pitch

1 2 3 Pronunciation

1 2 3 Voice Variation

1 2 3 Speaking Rate

1 2 3 General Effictiveness

MALE VOICE 1

1 2 3 Sense of Communication

1 2 3 Pleasantness of Pitch

1 2 3 Pronunciation

1 2 3 Voice Variation

1 2 3 Speaking Rate

1 2 3 General Effectiveness

MALE VOICE 2

1 2 3 Sense of Communication

1 2 3 Pleasantness of Pitch

1 2 3 Pronunciation

1 2 3 Voice Variation

1 2 3 Speaking Rate

1 2 3 General Effectiveness

MALE VOICE 3

1 2 3 Sense of Communication

1 2 3 Pleasantness of Pitch

1 2 3 Pronunciation

1 2 3 Voice Variation

1 2 3 Speaking Rate

1 2 3 General Effectiveness

VOICE RATING

FEMALE VOICE

TRAIT	VOICE 1	VOICE 2	VOICE 3
Sense of Communication	12	14	11
Pleasantness of Pitch	11	13	12
Pronunciation	14	14	13
Voice Variation	10	14	12
Speaking Rate	10	12	11
General Effectiveness	10	14	12
TOTAL*	67	81	71

MALE VOICE

TRAIT	VOICE 1	VOICE 2	VOICE 3
Sense of Communication	15	10	13
Pleasantness of Pitch	14	9	13
Pronunciation	13	12	11
Voice Variation	14	12	12
Speaking Rate	13	13	11
General Effectiveness	14	11	12
TOTAL*	83	67	72

* The columns represent the total number of points given by the five raters for each voice. In each case the voice with the highest number of total points was used.

APPENDIX D

MEANS AND FREQUENCIES

CURRENT TIME 1352 • 52 DATE 05/28/70
ELAPSED SINCE LAST CURRENT TIME 0,89 SECONDS

S U B • E F F E C T S T A B L E

ACHIEVEMENT TEST DEPENDENT VARIABLE IS X(5) NBR MISS

• OVERALL •

MINIMUM VALUE	MAXIMUM VALUE	MEAN	FREQ	SUM	STANDARD DEVIATION	SUM OF SQUARES	SUM OF SCUARED DEVIATIONS FROM THE MEANS
0,0000000	9,00000	3,390625	64	217,00000	2,08256	1009,00000	273,23438

• BY FACTOR CATEGORIES •

SUM	FREQ	MEAN	MEAN INCREMENT	SUM OF SQUARES	FACTOR AND CATEGORY MTR X(1) A	VISUAL X(2) B	SEX X(8) C	VOICE X(4) D	X(7) E
69,0000	32	2,15625	-1,23438	227,0000	1	0	0	0	0
148,0000	32	4,62500	1,23438	782,0000	2	0	0	0	0
121,0000	32	3,78125	0,39063	621,0000	0	1	0	0	0
96,0000	32	3,00000	-0,39063	388,0000	0	2	0	0	0
115,0000	32	3,59375	0,20313	555,0000	0	0	1	0	0
102,0000	32	3,18750	-0,20313	454,0000	0	0	2	0	0
112,0000	32	3,50000	0,10938	540,0000	0	0	0	1	0
105,0000	32	3,28125	-0,10938	469,0000	0	0	0	2	0
36,0000	16	2,25000	-0,29688	128,0000	1	1	0	0	0
33,0000	16	2,06250	0,29688	99,0000	1	2	0	0	0
85,0000	16	5,31250	0,29688	493,0000	2	1	0	0	0
63,0000	16	3,93750	-0,29688	289,0000	2	2	0	0	0
38,0000	16	2,37500	0,01563	126,0000	1	0	1	0	0
31,0000	16	1,93750	-0,01563	101,0000	1	0	2	0	0
77,0000	16	4,81250	-0,01563	429,0000	2	0	1	0	0
71,0000	16	4,43750	0,01563	353,0000	2	0	2	0	0

35,0000	16	2,18750	-0,07813	111,0000	1	0	0	1	0
34,0000	16	2,12500	0,07813	116,0000	1	0	0	2	0
77,0000	16	4,81250	0,07813	429,0000	2	0	0	1	0
71,0000	16	4,43750	-0,07813	353,0000	2	0	0	2	0
64,0000	16	4,00000	0,01563	326,0000	0	1	1	0	0
57,0000	16	3,56250	-0,01563	295,0000	0	1	2	0	0
51,0000	16	3,18750	-0,01563	229,0000	0	2	1	0	0
45,0000	16	2,81250	0,01563	159,0000	0	2	2	0	0
62,0000	16	3,87500	-0,01563	328,0000	0	1	0	1	0
59,0000	16	3,68750	0,01563	293,0000	0	1	0	2	0
50,0000	16	3,12500	0,01563	212,0000	0	2	0	1	0
46,0000	16	2,87500	-0,01563	176,0000	0	2	0	2	0
59,0000	16	3,68750	-0,01563	311,0000	0	0	1	1	0
56,0000	16	3,50000	0,01563	244,0000	0	0	1	2	0
53,0000	16	3,31250	0,01563	229,0000	0	0	2	1	0
49,0000	16	3,06250	-0,01563	225,0000	0	0	2	2	0
21,0000	8	2,62500	0,14063	73,0000	1	1	1	0	0
15,0000	8	1,87500	-0,14063	55,0000	1	1	2	0	0
17,0000	8	2,12500	-0,14063	53,0000	1	2	1	0	0
16,0000	8	2,00000	0,14063	46,0000	1	2	2	0	0
43,0000	8	5,37500	-0,14063	253,0000	2	1	1	0	0
42,0000	8	5,25000	0,14063	240,0000	2	1	2	0	0
34,0000	8	4,25000	0,14063	176,0000	2	2	1	0	0
29,0000	8	3,62500	-0,14063	113,0000	2	2	2	0	0
18,0000	8	2,25000	-0,01563	64,0000	1	1	0	1	0
18,0000	8	2,25000	0,01563	64,0000	1	1	0	2	0
17,0000	8	2,12500	0,01563	47,0000	1	2	0	1	0
16,0000	8	2,00000	-0,01563	52,0000	1	2	0	2	0
44,0000	8	5,50000	0,01563	264,0000	2	1	0	1	0
41,0000	8	5,12500	-0,01563	229,0000	2	1	0	2	0
33,0000	8	4,12500	-0,01563	165,0000	2	2	0	1	0
30,0000	8	3,75000	0,01563	124,0000	2	2	0	2	0

33,0000	8	4,12500	0,04688	185,0000	0	1	1	1	0
31,0000	8	3,87500	-0,04688	141,0000	0	1	1	2	0
29,0000	8	3,62500	-0,04688	143,0000	0	1	2	1	0
28,0000	8	3,50000	0,04688	152,0000	0	1	2	2	0
26,0000	8	3,25000	-0,04688	126,0000	0	2	1	1	0
25,0000	8	3,12500	0,04688	103,0000	0	2	1	2	0
24,0000	8	3,00000	0,04688	86,0000	0	2	2	1	0
21,0000	8	2,62500	-0,04688	73,0000	0	2	2	2	0
18,0000	8	2,25000	-0,14063	54,0000	1	0	1	1	0
20,0000	8	2,50000	0,14063	72,0000	1	0	1	2	0
17,0000	8	2,12500	0,14063	57,0000	1	0	2	1	0
14,0000	8	1,75000	-0,14063	44,0000	1	0	2	2	0
41,0000	8	5,12500	0,14063	257,0000	2	0	1	1	0
36,0000	8	4,50000	-0,14063	172,0000	2	0	1	2	0
36,0000	8	4,50000	-0,14063	172,0000	2	0	2	1	0
35,0000	8	4,37500	0,14063	181,0000	2	0	2	2	0
10,0000	4	2,50000	-0,01563	34,0000	1	1	1	1	0
11,0000	4	2,75000	0,01563	39,0000	1	1	1	2	0
8,0000	4	2,00000	0,01563	30,0000	1	1	2	1	0
7,0000	4	1,75000	-0,01563	25,0000	1	1	2	2	0
9,0000	4	2,00000	0,01563	20,0000	1	2	1	1	0
9,0000	4	2,25000	-0,01563	33,0000	1	2	1	2	0
9,0000	4	2,25000	-0,01563	27,0000	1	2	2	1	0
7,0000	4	1,75000	0,01563	19,0000	1	2	2	2	0
23,0000	4	5,75000	0,01563	151,0000	2	1	1	1	0
20,0000	4	5,00000	-0,01563	102,0000	2	1	1	2	0
21,0000	4	5,25000	-0,01563	113,0000	2	1	2	1	0
21,0000	4	5,25000	0,01563	127,0000	2	1	2	2	0
18,0000	4	4,50000	-0,01563	106,0000	2	2	1	1	0
16,0000	4	4,00000	0,01563	70,0000	2	2	1	2	0
15,0000	4	3,75000	0,01563	59,0000	2	2	2	1	0
14,0000	4	3,50000	-0,01563	54,0000	2	2	2	2	0

CURRENT TIME 1352 • 57 DATE 05/28/70
ELAPSED SINCE LAST CURRENT TIME 0,55 SECONDS

S U B • E F F E C T S T A B L E

ATTITUDE TEST

DEPENDENT VARIABLE IS X(6) TOTAL

• OVERALL •

MINIMUM VALUE	MAXIMUM VALUE	MEAN	FREQ	SUM	STANDARD DEVIATION	SUM OF SQUARES	SUM OF SQUARED DEVIATIONS FROM THE MEANS
14,0000000	30,00000	24,234375	64	1551,00000	3,82449	38509,00000	921,48438

• BY FACTOR CATEGORIES •

SUM	FREQ	MEAN	MEAN INCREMENT	SUM OF SQUARES	FACTOR AND CATEGORY MTR X(1) A	VISUAL X(2) B	SEX X(8) C	VOICE X(4) D	X(7) E
790,0000	32	24,68750	0,45313	19960,0000	1	0	0	0	0
761,0000	32	23,78125	-0,45313	18549,0000	2	0	0	0	0
750,0000	32	23,43750	-0,79688	18028,0000	0	1	0	0	0
801,0000	32	25,03125	0,79688	20481,0000	0	2	0	0	0
766,0000	32	23,93750	-0,29688	18974,0000	0	0	1	0	0
785,0000	32	24,53125	0,29688	19535,0000	0	0	2	0	0
783,0000	32	24,46875	0,23438	19519,0000	0	0	0	1	0
768,0000	32	24,00000	-0,23438	18990,0000	0	0	0	2	0
380,0000	16	23,75000	-0,14063	9236,0000	1	1	0	0	0
410,0000	16	25,62500	0,14063	10724,0000	1	2	0	0	0
370,0000	16	23,12500	0,14063	8792,0000	2	1	0	0	0
391,0000	16	24,43750	-0,14063	9757,0000	2	2	0	0	0

395,0000	16	24,68750	0,29688	10075,0000	1	0	1	0	0
395,0000	16	24,68750	-0,29688	9885,0000	1	0	2	0	0
371,0000	16	23,18750	-0,29688	8899,0000	2	0	1	0	0
390,0000	16	24,37500	0,29688	9650,0000	2	0	2	0	0
412,0000	16	25,75000	0,82813	10698,0000	1	0	0	1	0
378,0000	16	23,62500	-0,82813	9262,0000	1	0	0	2	0
371,0000	16	23,18750	-0,82813	8821,0000	2	0	0	1	0
390,0000	16	24,37500	0,82813	9728,0000	2	0	0	2	0
378,0000	16	23,62500	0,46438	9280,0000	0	1	1	0	0
372,0000	16	23,25000	-0,46438	8748,0000	0	1	2	0	0
389,0000	16	24,25000	-0,46438	9694,0000	0	2	1	0	0
413,0000	16	25,81250	0,46438	10787,0000	0	2	2	0	0
375,0000	16	23,43750	-0,23438	8955,0000	0	1	0	1	0
375,0000	16	23,43750	0,23438	9073,0000	0	1	0	2	0
408,0000	16	25,50000	0,23438	10564,0000	0	2	0	1	0
393,0000	16	24,56250	-0,23438	9917,0000	0	2	0	2	0
403,0000	16	25,18750	1,01563	10369,0000	0	0	1	1	0
363,0000	16	22,68750	-1,01563	8605,0000	0	0	1	2	0
380,0000	16	23,75000	-1,01563	9150,0000	0	0	2	1	0
405,0000	16	25,31250	1,01563	10385,0000	0	0	2	2	0
196,0000	8	24,50000	0,26563	4950,0000	1	1	1	0	0
184,0000	8	23,00000	-0,26563	4286,0000	1	1	2	0	0
199,0000	8	24,87500	-0,26563	5125,0000	1	2	1	0	0
211,0000	8	26,37500	0,26563	5599,0000	1	2	2	0	0
182,0000	8	22,75000	-0,26563	4330,0000	2	1	1	0	0
188,0000	8	23,50000	0,26563	4462,0000	2	1	2	0	0
189,0000	8	23,62500	0,26563	4569,0000	2	2	1	0	0
202,0000	8	25,25000	-0,26563	5188,0000	2	2	2	0	0

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[illegible],0000	4	23,25000	0,14063	2275,0000	2	1	1	2	0
[illegible],0000	4	22,25000	0,14063	2007,0000	2	1	2	1	0
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197,0000	8	24,62500	0,04688	4893,0000	1	1	0	1	0
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215,0000	8	26,87500	-0,04688	5805,0000	1	2	0	1	0
195,0000	8	24,37500	0,04688	4919,0000	1	2	0	2	0
178,0000	8	22,25000	-0,04688	4062,0000	2	1	0	1	0
192,0000	8	24,00000	0,04688	4730,0000	2	1	0	2	0
193,0000	8	24,12500	0,04688	4759,0000	2	2	0	1	0
198,0000	8	24,75000	-0,04688	4998,0000	2	2	0	2	0
192,0000	8	24,00000	-0,64063	4720,0000	0	1	1	1	0
186,0000	8	23,25000	0,64063	4560,0000	0	1	1	2	0
183,0000	8	22,87500	0,64063	4235,0000	0	1	2	1	0
189,0000	8	23,62500	-0,64063	4513,0000	0	1	2	2	0
211,0000	8	26,37500	0,64063	5649,0000	0	2	1	1	0
177,0000	8	22,12500	-0,64063	4045,0000	0	2	1	2	0
197,0000	8	24,62500	-0,64063	4915,0000	0	2	2	1	0
216,0000	8	27,00000	0,64063	5872,0000	0	2	2	2	0
213,0000	8	26,62500	-0,14063	5701,0000	1	0	1	1	0
1[illegible],0000	8	22,75000	0,14063	4374,0000	1	0	1	2	0
199,0000	8	24,87500	0,14063	4997,0000	1	0	2	1	0
196,0000	8	24,50000	-0,14063	4888,0000	1	0	2	2	0
190,0000	8	23,75000	0,14063	4668,0000	2	0	1	1	0
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209,0000	8	26,12500	0,14063	5497,0000	2	0	2	2	0
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[illegible],0000	4	22,25000	0,14063	2089,0000	1	2	1	2	0

APPENDIX E

MATHEMATICS TEXTBOOKS CONSULTED

APPENDIX E

Brownell, W. A., and Weaver, J. F. Mathematics We Need. Waltham, Massachessets: Ginn and Company, 1965.

Clark, C. H., and others. One By One. New York: Harcourt, Brace and World, 1965.

D'Augustine, C. H., and others. New Dimensions in Mathematics. New York: Harper and Row, 1970.

Deans, E. Modern Mathematics Laboratory. New York: American Book Company, 1964.

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Greater Cleveland Mathematics Program. Chicago: Science Research Associates, 1962.

Merton, E. L., and Brueckner, L. J. Moving Ahead in Arithmetic. New York: Holt, Rinehart and Winston, 1963.

Spitzer, H. F., and Norman, M. Exploring Arithmetic. New York: McGraw-Hill, 1958.