THE EFFECTIVENESS OF A PERCEPTUAL-MOTOR APPROACH TO DEVELOPING READING READINESS IN KINDERGARTEN CHILDREN

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CHAPTER I

THE PROBLEM AND DEFINITION OF TERMS USED

It has been an accepted fact that learning to read requires the ability to recognize and perceive the printed symbol. However, the effectiveness of perceptual-motor ability in reading has been a subject of controversy among educators for many years. Most researchers have agreed that minimal perceptual ability is apparently necessary for reading. Some have made more positive claims to the effect that training in visual perception and motor coordination can mean the difference between good and poor readers. Robert Lowder states the following:

> Previous studies indicated that a relationship between perceptual ability and reading exists. School achievement in the early grades consists mostly of reading; therefore it is hypothesized that a relationship between perception of form outline, as measured by copying geometric figures, is related to school achievement in the early grades.[1]

I. THE PROBLEM

<u>Statement of the problem</u>. It was the purpose of this study (1) to use a highly structured perceptual-motor approach to reading readiness with kindergarten children; (2) to present an unstructured approach to reading readiness to another group of kindergarten children; and (3) to compare the progress in reading readiness of these two kindergarten groups through the use of pre- and post-standardized tests.

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[1]Robert Glenn Lowder, "Perceptual Ability and School Achievement," (Doctoral Dissertation, Purdue University, Lafayette, Indiana, 1966).

Importance of the study. Perception has been defined as the mind's response to sensations received from the outside world. Without the capacity to perceive, the human mind is unable to form associations with symbols and their meanings. Nor is it able to discover differences and similarities in word forms, a skill that has long been recognized as fundamental in learning to read.[2] Much of the research now in progress which relates perception to reading concentrates on the perceptual problems of children who already have reading difficulties. An increased understanding of the general perceptual patterns of children, before disability occurs, may provide some important guidelines for ways in which all children can be taught to read more effectively in the beginning.[3]

Therefore, if highly structured perceptual-motor activities can strengthen a child's visual perception and enable him to become a better reader, the kindergarten classroom is the ideal place in which to implement such a program.

Limitations of the study. This study was limited to (1) ten low-average ability kindergarten children, ages five and six; (2) two kindergarten programs in reading readiness, the traditional, less structured program and the Winter Haven Lions Research Program; and (3) to a time span of two months.

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[2]Gertrude Hildreth, "Some Principles of Learning Applied to Reading," (in Remedial Reading; an Anthology of Sources, Leo M. Schell and Paul C. Burns, eds. (Boston: Allyn and Bacon, Inc., 1968), p. 204.

[3]William K. Durr (ed.), "Perception," (in Reading Instruction-Dimensions and Issues, (Boston: Houghton-Mifflin Co., 1967), p. 252.

II. DEFINITION OF TERMS USED

Body schema. Body schema refers to one's awareness of the parts of his body and their relationship to the surrounding environment.[4]

Convergence of the eyes. When the eyes converge, both of them focus on a center point.

Divergence of the eyes. When the eyes diverge they move from the center focal point, scanning a number of visual stimuli before them.

Fixations of the eyes. Fixations refer to the stoppage or pause that the eye makes so it can react to graphic stimuli during reading.[5]

Frostig Developmental Test of Visual Perception. This test was designed to indicate perceptual weaknesses that are contributors to reading difficulty. Among the subtests are those concerned with eye-motor coordination, figure ground relationships, form constancy, and position in space.[6]

Haptic sense. Haptic sense is the sense of touch involving feeling and one's hands.

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[4]Jack Dunsing and Newell C. Kephart, "Motor Generalized in Space and Time," Learning Disorders, Jerome Hellmuth, (ed.), (Seattle, Washington: Special Child Publications, Vol. I, 1965), p. 90.

[5]Emerald V. Dechant, Improving the Teaching of Reading (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1964), p. 13.

[6]Marianne Frostig, "The Marianne Frostig Developmental Test of Visual Perception, 1963 Standardization," Perceptual and Motor Skills, (1964), pp. 464-469.

Hemispheric brain dominance. Dominance refers to that side of the brain which has consistent motor control over the opposite side of the body.

Interfixations of the eyes. Interfixations are the periods between fixations or visual stoppage when the eye is scanning the visual stimuli.[7]

Metropolitan Readiness Test. This test was devised 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 six subtests included in the Metropolitan Readiness Test (MRT) are word meaning, listening, matching, alphabet, numbers, and copying skills.[8]

Motor systems. A motor system is a system of relationship. As a child manipulates an object or relationship motor-wise, he observes the perceptual data which he is receiving concurrently.[9]

Parquetry blocks. Parquetry blocks are small, colored blocks of four shapes; squares, triangles, rectangles, and diamonds. They may be fitted together in various designs after the manipulator first observes a pattern.

Perceptual-motor program. This approach to learning provides a

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[7]Dechant, loc., cit.

[8]Gertrude Hildreth, Metropolitan Readiness Tests, Manual of Directions, (Harcourt, Brace, and World, Inc., 1966), p. 2.

[9]Newell C. Kephart, "Perceptual-Motor Aspects of Learning Disability," Exceptional Children, 31:201-206, (February, 1968), p. 267.

central approach of coping with problems of spatial and temporal concepts. The meaning of incoming sensory stimuli observed and identified by the occupational therapist in relation to the motor response the child gives to it.[10]

Pre- and post-testing. Pre-testing is a means of measuring a person's ability level before a particular training program, involving that person, has begun. Post-testing is a means of measuring that same person after he has been involved in a particular study. Often the results are compared to those of the pre-test to reach some conclusions.

Spatial coordination. Spatial coordination is the awareness and control of one's body in space regardless of changing positions.

Template. A template is a cardboard cut-out of various geometric shapes that may be used as a guide when outlining these shapes on paper or the chalkboard. A single template has only one shape on it while a multiple template might have smaller cut-outs of several shapes.

Unstructured and/or traditional kindergarten classrooms. This type of kindergarten program refers to one in which the attainment of social and mental maturity are the specific goals. However, methods used in this type of classroom in order to obtain these goals are not rigid and specific in themselves but rather generalized.

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[10]Barbara M. Knickbocker, "A Central Approach to the Development of Spatial and Temporal Concepts," Learning Disorders, Jerome Hellmuth, ed. (Seattle, Washington: Special Child Publications, Vol. III, 1968), p. 291.

Visual decoding. "Visual decoding is the ability to perceive and recognize visually presented information."[11]

Visual discrimination. Visual discrimination refers to the ability to select differences in color, shape, and size which are essential if a child is going to be able to note differences between sentences and letters, etc., in understanding relationships and learning to read.[12]

Winter Haven (Florida) Perceptual-Motor Program. Sponsored by the Winter Haven, Florida Lions Club, this is a highly structured perceptual-motor program based on the concept that learning to read involves a child's body as well as his mind.[13]

Word perception. Word perception refers to the structuring of stimuli to arrive at some meaning.[14]

III. ORGANIZATION OF THE REMAINDER OF THE REPORT

Chapter I states the problem and defines the terms used within this paper. This is followed by Chapter II, which is a review of the

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[11]Robert P. Sedgewick, "The Examination of Higher Cerebral Functions of Children," Learning Disorders, Jerome Hellmuth, ed. (Seattle, Washington: Special Child Publications, Vol. III, 1968), p. 24.

[12]Orville Johnson, Education for the Slow Learners (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1963), p. 131.

[13]Charles W. McQuarrie, "The Team Approach to Help a Child," Florida Lions Magazine (1967).

[14]Hope M. Smith, "Motor Activity and Perceptual Development," Education Digest, 3:41-4, (April, 1968), p. 291.

literature in four parts. Chapter III is a discussion of materials used and methods employed to determine those goals set up in the problem. Chapter IV is concerned primarily with the results of the research. The summary and recommendations are included in Chapter V.

CHAPTER II

REVIEW OF THE LITERATURE

The society of today is a changing one. In fact, change has become a byword in all aspects of this country's culture. It would thus be reasonable to conclude that education is changing also - hopefully improving. Many are the changes that have taken place in elementary schools. Methods and materials have been improved, the levels of development have been raised, and new subject areas have been added. Yet the program of "reading readiness" in many kindergarten classrooms has remained unaffected.[15]

Kindergarten readiness is a broad topic, sometimes referred to as "early reading instruction" or more simply "reading readiness."[16] All of these terms have been defined in many ways directly and also by implications. Up to the present time, the kindergarten classroom has represented progress in two areas of living; a time for growth and development and an area of experience and training.[17] Typically these elements have been reflected in such concepts as social, emotional, or physical maturity.

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[15] Robert L. Hillerich, "Kindergarteners Are Ready! Are We?" Elementary English, 42:569-73, (May, 1965), p. 569.

[16] Robert L. Hillerich, "An Interpretation of Research in Reading Readiness," Elementary English, 43:359-64, (April, 1966), p. 359.

[17] Ibid.

Reading readiness has long been an integral part of even the most unstructured kindergarten program. However, as in other aspects of education, the content of kindergarten has changed. More highly structured rationale are being discovered, developed, and studied to determine the effectiveness and necessity of such in a more intensified kindergarten readiness program.

Today, educators are interested in research which will help the child who finds reading a difficult task. Much ferment has been created during past decades over the relative merits of various approaches to readiness programs for children with reading disabilities.[18] "A constant in virtually all of these approaches has been a set of motor experiences for which therapeutic values are claimed."[19] Visual discrimination plays a major role in reading and even the traditional kindergarten strives for the ability to perceive through such motor experiences as puzzles and copying techniques.

The growth of formal motor therapy programs is encouraged by psychologists and educators who note that ". . . slow learners among children performed poorly on tests of perceptual ability in test items assessing motor ability."[20] According to Marianne Frostig, disturbances in visual perception among retarded readers are frequent.[21] If motor

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[18] Hope M. Smith, "Motor Activity and Perceptual Development," Education Digest, 3:41-4, (April, 1968), p. 41.

[19] Ibid.

[20] Ibid.

[21] Marianne Frostig and D. Horne, Frostig Program for Development of Visual Perception (Chicago: Follet Publishing Co., 1964), p. 204.

coordination is an attribute to reading retardation, can a motor approach to visual perception give pre-readers a headstart?

This study attempts to first review briefly each of these processes; visual perception and motor coordination, separately, then show their relationship to one another in the culmination of the reading act.

I. LITERATURE ON VISUAL PERCEPTION

"The ability to recognize and decode visually-presented information may be called visual perception."[22] In reading, the visual perception of words must operate smoothly, swiftly, and simultaneously. Since all words in the English language are but longer or shorter combinations of only twenty-six different letter forms, several of which are confusing, such as "b", "d", "p", and "q", learning to distinguish among confusing word symbols becomes a formidable task for any child.[23]

Reading accomplishment will not be made without visual and perceptual readiness. A child must be able to focus at twenty inches or less. He must have depth perception and binocular coordination. In visual perception, difficulty usually occurs when certain details alone are used as a clue to a word. The child attends to one part and fails to see the form as a whole. Space and form are a necessary part of perception. Without form and space, one cannot reproduce or identify words. Both form and space establish relationship. Form establishes relation-

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[22]Sedgewick, loc. cit.

[23]Gertrude Hildreth, "Some Principles of Learning Applied to Reading," Remedial Reading; an Anthology of Sources, Leo M. Schell and Paul C. Burns, eds. (Boston: Allyn and Bacon, Inc., 1968), p. 204.

ships within a figure and space established relationships between figures.[24]

The reading teacher must build up an integrated perceptual pattern that brings meaning to these relationships. Visual perception involves comparing, relating, and integrating, which is a continuous process that changes with one's experience.[25]

II. LITERATURE ON MOTOR COORDINATION

The motor process involves all parts of the body. The reading act is concerned with all of these beginning first with vision. It can be agreed that the visual process itself is motor. "Vision is the process through which the eyes must arrange themselves and center upon a specific in an illuminated world which one calls the visual world."[26] The eyes sweep over it. They are never still, for one cannot see without movement no matter how slight. When movement stops, information is no longer gained. The eye reacts with movement during reading by fixations, regressions, and return sweeps. The eyes do not make a continuous sweep across the page, but rather make quick, short movements with pauses interspersed.[27] Children may not be ready visually for reading before the age of eight. At six years of age, the eyes are frequently too far-sighted to see clearly.[28] Their ability to focus is part of motor

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[24] Durr, op. cit., p. 254.

[25] Ibid., p. 257

[26] Ernest Ames, "Interdisciplinary Approach to Visual Readiness in Reading," Education, 88:357-62, (April, 1968), p. 358.

[27] Dechant, op. cit., p. 13.

[28] Ibid., p. 12.

coordination.

The entire motor process involves two elements of time; a fixation time and a movement time. During fixation time the intake process is suspended and the inner process of reading occurs. The length of the fixation pause depends upon the difficulty of the reading material, the reader's age and vocabulary level, and his familiarity with the content. The pause may vary between .22 seconds or .32 seconds, including both seeing and thinking time.[29]

The eyes must converge during interfixation movements but diverge during the fixation that follows and this takes time. Taylor reports that the average first grader makes 224 fixations per 100 words as compared to the average college student's ninety fixations per 100 words.[30] Since fixations occur for ninety-two to ninety-four per cent of the reading time, it is imperative that the reader have coordination and motor control of his eyes if he is to get anything accomplished.

The eyes are not the only part of the body involved in motor coordination. Some researchers hypothesize that reading disorders may stem from lack of hemispheric brain dominance and further, that hemispheric dominance is fostered by normally developed sequences of motor activity observed in a normally functioning child.[31] This activity affects the hand and foot movement besides eye movements. Therefore, it seems

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[29] Ibid.

[30] Emerald V. Dechant, Improving the Teaching of Reading (Englewood Cliffs, New Jersey: Prentice-Hall, 1964), p. 14.

[31] Hope M. Smith, "Motor Activity and Perceptual Development," Education Digest, 3:41-4, (April, 1968), p. 41.

reasonable to conclude that when these developing motor sequences are disrupted or prevented from running their normal course, the eventual establishment of this hemispheric dominance does not take place.

Piaget suggests that the period comprising sensorimotor adaptations is from birth to seven years of age. Thus the most crucial period for this motor activity in order to promote perceptual development is during the child's pre-school through first grade learning experiences. Sensorimotor experience is basic to later intellectual operations of children. If gross motor activity is an important factor in perceptual development, no child should want for such activity.[32]

III. LITERATURE ON A PERCEPTUAL-MOTOR APPROACH RO READING READINESS

Paralleling this educational development has been work by optical researchers who suggest that interrelationships of vision, motor activity, and intelligence are far greater than ever before imagined.[33]

The visual process is related to the rest of the body. Two-thirds of the sensing done by the body comes from the eyes.[34] For example, the eyes must tell the hands how to twist parts of a puzzle to make them fit. Slamming and pounding will not work. It is control that is vitally necessary in beginning reading.

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[32]Ibid., 42.

[33]Sedgewick, loc. cit.

[34]Ames, loc. cit.

> Coordinating the eyes and hands to determine a set direction, sensing left from right, and distinguishing figure and ground are primary demonstrations of a child's capacity to control himself with basic perceptual skill.[35]

Visual control and perception is not tested alone but rather in combination with schema of body image, of surrounding space, and kinesthetic coordination. Vision leads the entire body in order to discover new relationships in space. These relationships are confirmed through body activity. Thus a child throwing a ball against a wall can learn relationships of height, distance, direction, and slant that are not available through visual exploration. He can learn this way providing he has generalized and integrated the necessary motor patterns thoroughly. As learning proceeds, a child's most efficient means of making estimates of form and space relationships is vision.

Consistent and efficient motor patterns permit the child to explore his environment and systematize his relationship to it. Perceptual data are similarly systematized by comparing them with this motor system. Through such perceptual-motor matching, the perceptual world of the child and his behavorial world come to coincide.[36]

> Visual stimuli do not have in themselves relationships of directionality or space and space coordinates. Horizontal, vertical, and depth dimensions are attributed to visual stimuli on the basis of kinesthetic awareness of these coordinates and subsequent translation through visual clues.[37]

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[35]Durr, *op. cit.*, p. 253.

[36]Newell C. Kephart, "Perceptual Motor Aspects of Learning Disability," *Exceptional Children*, 31:201-206, (December, 1964), p. 201.

[37]Newell C. Kephart, *The Slow Learner in the Classroom* (Columbus, Ohio: Charles B. Merrill Books, Inc., 1960), p. 25.

If such kinesthetic awareness has not been developed, visual stimuli will not have direction or spatial coordination.[38] These visual-tactile experiences necessary for visual perception require four to six years for sufficient development in order to reach a reading level in the child.[39]

Perceptual input is not a replication of outside energy patterns. It is a translation of outside energy into neural patterns. The input-output functions of the organism occur in a closed cycle. Anything which happens in one area affects all others. The total activity includes four processes: input, integration, output, and feedback. Since one cannot separate the perceptual and motor in the processes of the child, one should not attempt to separate the processes when teaching the child.[40]

If a child's learning difficulties are related to a deficiency in perceptual-motor readiness, it would seem necessary to identify the point at which the breakdown occurred. A child's development may have been blocked at one of many stages. One child may have failed to learn the basic motor patterns themselves. Another may have completed this learning, but have failed to make perceptual-motor matches. Still another may have progressed through these stages but then have broken down at the level of form perception or space structuring.

Frostig has stressed the need for the child to know his own body parts and their relationships to other objects in space. A stable body

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[39] George D. Spache, Reading in the Elementary School (Boston: Allyn and Bacon, 1964), p. 154.

[40] Kephart, *op. cit.*, p. 26.

schema depends upon the sequential development of an integrated motor awareness to which other sensory systems, as haptic, visual, and auditory, are matched.[41] Why is body awareness important?

> If we take a cube and label one side "top," another "bottom," a third "front," and a fourth "back," there remains no form of words by which we can describe to another person which of the remaining sides is "right" and which is "left." We can only point and say "here" is right and "there" is left.[42]

This illustrates one's dependence upon action-oriented body awareness of directional tendencies. Eventually vision takes over as one's most efficient means of perceiving space. However, it's accuracy depends on sound haptic-motor relationships. G. N. Getman, a leading educator, recommends that the commercial toy "Etch-a-Sketch" be used as a means of manual directional training.[43] The child must move the pointer with his hands while his eyes determine, from observing the lines thus far made, which way to go next to complete the design.

By the age of five, the normal child can draw a square. It is hard to realize what this simple task involves. To copy a square, a child must locate a beginning point. This he does with reference to his own body. He must get his hand to an exact starting point and distinquish one direction from another.[44] According to Kephart, certain relationships in space will be meaningless to a child if he has not estab-

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[41]Jack D. Dunsing and Newell C. Kephart, "Motor Generalizations in Space and Time," Learning Disorders, Jerome Hellmuth, ed. (Seattle, Washington: Special Child Publications, Vol. I, 1965), p. 90.

[42]Ibid., p. 108.

[43]Spache, op. cit., p. 158.

[44]Newell C. Kephart, The Slow Learner in the Classroom (Columbus, Ohio: Charles B. Merrill Books, Inc., 1960), p. 25.

lished which is right and which is left. Without laterality, there is no difference in the printed symbols "b" and "d". It is not the fact that the child has not yet learned the difference. It is not the fact that he reverses the letters. The fact is that for this child, no difference exists. No direction exists so no difference based on direction can exist.[45] Thus after determining the starting point, the child must determine directionality. However, before starting movement, whether in copying or reading, the child must have body image.

A child will show difficulty in body image activities when required to move various parts of the body. For example, he may not be able to move one arm without moving the other. "Only through a reliable and consistent body image can the child develop a reliable and consistent point of origin for either perceptions or motor response."[46]

For the child who has been unable to establish body image and dimensions in space in his visual world, the words on a page of print may become an unintelligible mass of meaningless marks. They may not hold still, but float about on the page. Even worse, they may look different to him at different times and under different circumstances.[47]

Form and Space are important for the same reason. They establish relationship. Form establishes the relationships within a figure and space establishes relationships between figures.[48]

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[45] Ibid.

[46] Ibid., p. 52.

[47] Kephart, op. cit., p. 264.

[48] Durr, op. cit., p. 254.

All spatial relationships in the world around us are relative. Gravity is the point of origin for all relationships. This stable relationship of gravity is achieved through the motor pattern of balance and posture. A child should be able to maintain balance and relationship to gravity under many conditions and with his body in a large number of different positions. He should not lose balance or awareness of gravity when the position of his body changes or when its motion alters. It is through motor activities such as walking, running, and jumping that the body investigates relationships around it. When the child reaches the stage where he can relate to gravity in the varied and flexible way described, it is said that he has developed balancing generalizations.[49]

Balance is only one of many aspects of motor control. Rhythm is another. Rhythm is different from coordination in that it denotes free and patterned motor skill rather than gross motor behavior. Poor readers may coordinate well but not be arythmic. Research in both Berea College and Fryeburg Academy, indicate that the child who has extreme difficulty in decoding words usually does not have a sense of rhythm.[50] He is unable to express himself in rhythmic terms whether it be reading, spelling, or handclapping.

Dr. Charles Shedd suggested that some neurological malfunction in the central nervous system interferes with ordered reception, storage,

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[49]Dunsing and Kephart, loc. cit.

[50]Charles Drake, "Reading, 'Ritin, and Rhythm," The Reading Teacher, 18:202-5, (December, 1964), p. 202.

and reproduction of sequential stimuli.[51] This inability to process and store stimuli in regular sequence is also involved with the irregular functioning of the centers that control all fine motor outputs including reading. In Dr. Shedd's study the development of rhythm among children was supported positively. "Those students who showed the greatest growth in rhythmic development usually also showed the greatest gain in reading ability."[52]

The rhythmic procedure is naturally most successfully initiated at the kindergarten level. At this age, the child is not inhibited or embarrassed but willing to participate freely. Little does he realize the effect this playful game of motor control might possibly have on his future success.

The goal of perceptual motor training is the achievement of more adequate perceptual function by improving directionality, spatial orientation, and visual perception of objects and events through sensori-motor experiences.

Reading begins with these sensations, and the subsequent recognition of the printed symbol. Yet the critical element in the reading act is the meaningful response to rather than the recognition of symbols. Perception must include the arousal of meaning. Reactions to printed words are determined by the experience that the reader has had with those objects or events for which the symbol stands. Hopefully, through a perceptual-motor program begun at an early age, the child will learn to know

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[51] Ibid., p. 205.

[52] Ibid.

himself and his environment better. Because of these familiar experiences it is believed that the task of learning to read will not be a difficult one.

"It appears that readiness for reading is something to develop, rather than something merely to wait for."[53] There is much to be learned concerning exactly what types of preparatory experiences are most effective in reading readiness. However, if such a basic program of perception and motor control can do so much, it would be tragic to allow this opportunity to slip by unnoticed.

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[53] Hildreth, op. cit., p. 35.

CHAPTER III

THE MATERIALS USED AND GROUPS STUDIED

This study was concerned with a perceptual-motor program for the kindergarten child, developed by the Winter Haven Lions Research Foundation, Inc., Winter Haven, Florida, and the effect of such a program on reading readiness at the kindergarten level. Two groups, each composed of five children, ages five and six, were involved in the study.

In October, 1968, the fifty children of the morning and afternoon kindergarten classes in one school were given the Frostig Developmental Test of Visual Perception[54] and the Metropolitan Readiness Test (MRT), Form A.[55] The Frostig test, in addition to the MRT, was chosen as a pre-test because it measured five visual perceptual skills; perception of position in space, spatial relationships, constancy, visual-motor coordination, and figure-ground perception, which it was hoped the Winter Haven program would develop. Five children receiving the lowest scores in each class were selected to participate in the study. Group C, composed of the five morning class subjects, was instructed in the traditional kindergarten program followed in most public schools throughout the city. Group E, composed of the five afternoon subjects, was instructed in the Winter Haven program.

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[54]Marianne Frostig, Developmental Test of Visual Perception, (Palo Alto, California: Consulting Psychologist's Press, 1966).

[55]Gertrude H. Hildreth, Nellie L. Griffiths, and Mary E. McGauvran, Metropolitan Readiness Test (New York: Harcourt, Brace and World, Inc., 1966).

The activities employed in a reading readiness program in the typical kindergarten classroom are varied. Many areas of growth are developed. Among these are visual perception and motor coordination.

Visual perception is developed in kindergarten through numerous activities. Among these are matching exercises requiring the child to distinguish differences and similarities in visual images. The child's ability to note missing parts of a whole is enhanced through designs made with parquetry blocks. Parquetry blocks are also used to help the child make a design after noting only the outline of one. The ability to distinguish between colors, shapes, and figure-ground relationships is often stressed in the beginning math program in kindergarten.

Motor coordination is also developed in the kindergarten classroom. This can be done through any rhythmic activity. Rhythms play a major role in the kindergarten classroom, particularly in relation to musical activities. In addition to these structured rhythms are rope jumping, ball bouncing, building blocks, and cutting with scissors, motor activities found in nearly every kindergarten.

Visual perception and motor coordination are difficult to separate as one seems to depend upon the other. The perceptual-motor aspect of readiness is an important one and found to some extent in every kindergarten classroom. Puzzles, which may be reproduced from a copy or from memory, are an example of this training as are pegboard and marble designs. Tracing in the air is helpful when teaching a child to recognize and form letters. While making the movements necessary in forming a letter, the child must also "see" the letter in the air.

Thus, the traditional kindergarten classroom incorporates activities of perceptual and motor skill in nearly every aspect of learning readiness.

The Winter Haven program tests and trains visual-motor development among five- and six-year-olds before they begin to read. The five children in group E participated ten to fifteen minutes daily for seven weeks in this program. The teacher used a kit provided by the Winter Haven Research Foundation. This kit included: A Perceptual Testing and Guide for Kindergarten Teachers, the Kindergarten Teacher's Test Manual, two table templates, one set of six chalkboard templates, and 200 worksheets referred to as forms A and B.

Prior to the actual training period, each child was given the perceptual test developed by the Winter Haven program.

> It is desirable to point out that this test was not intended for use as a specific predictor of reading ability. It's most proper use was to identify those children who are likely to experience problems in general school achievement which may be due to perceptual difficulties.[56]

The test required the children to copy, as accurately as possible, the eight forms presented to them visually. (See the appendix for an example of the visual test.) The forms were not identified by name although it was helpful if the teacher described the salient feature of the form to be copied, such as noting that the two lines of the "X" to be copied are of equal length.

The training procedure took place in the regular kindergarten class period during free play and rest periods. The activities consisted of template drawing, copying, and body balancing and the period

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[56]Charles W. McQuarrie, A Perceptual Testing and Training Guide for Kindergarten Teachers, (Winter Haven, Florida: Winter Haven Lions Research Foundation, Inc., 1967), p. 48.

began with table template practice. Each child was asked to hold his table template at eye level with the circle at the upper left-hand corner of the template. The pencil was held in the dominant hand. The child placed the pencil tip at the top of the circle and slowly moved the pencil counter-clockwise in a smooth easy manner around the edge of the circle. Keeping the pencil tip in contact with the edge of the opening, the children counted aloud, one-two-three- in cadence- up to ten. It was stressed by the teacher that each child must be able to "feel" the difference between a circle and an oval.

After completing all six shapes on the template, the students were shown how to trace those shapes in the air, "seeing" the shapes as they did so. Finally, this table template session was completed by asking the children to copy these six forms as accurately as possible on an 8 1/4 by 11 inch sheet of paper.

The skill of copying required visual perception and motor coordination. The child was told to make his hands draw what he saw with his eyes. In this session the teacher began with training form A. (See appendix.) This record sheet displayed a circle, a vertical oval, and a horizontal oval at the top of the page. The lower portion of the sheet was divided into three sections. The child was asked to reproduce these forms in the space provided at the bottom of the sheet. At this stage the children were able to call the forms by their correct names. After the three forms had been copied, the pupils were instructed to slowly trace over each figure ten times. Further training sessions using form A were continued until the students could reproduce the forms with reasonable accuracy and with the directionality component of the ovals clearly in evidence.

Template training also involved chalkboard drawing which demanded the use of large muscle skills. The previous two training procedures were done with all five students participating at once. The chalkboard training was most effective with only two children working at the same time. The students stood twelve to fifteen inches away from the surface of the chalkboard with the weight distributed on both feet. A small "x" was placed at a point on the chalkboard straight from the tip of the nose. The "x" was then centered in the opening in the single form template. The palm of the non-dominate hand held the template against the chalkboard. The circle template was used first, followed by the vertical oval, the horizontal oval, the square, the triangle, and lastly, the horizontal rectangle template.

The pupils were instructed to place the chalk at the top of the opening of the circle. They were then told to move the chalk in a counter-clockwise direction with a slow, easy movement. It was stressed that the chalk must be pressed against the side of each opening as the tracing was done. Eventually the children were able to trace either way around the openings with equal facility.

When the shape was outlined twenty times, the template was removed from the chalkboard. The students were asked to re-trace the form just completed. The form was then erased, and they were instructed to draw another form, identical in size and shape, to the one made when using the template. The template was then centered on this free-hand drawing and one last tracing was made, thus enabling the teacher to evaluate whether the children's perceptual visual-motor judgment of "size" and "shape" was substantially correct. A training session at the chalkboard did not exceed ten minutes.

The walking beam was simply a ten to twelve foot 2 × 4. It was supported by three bridges, sixteen inches in width, made from 2 × 6 lumber. The training was done barefooted. The shoulders and head were held erect and the eyes were positioned on an object straight ahead. Three body positions were used: (1) Arms held straight out from the shoulders; (2) Arms held straight up from the shoulders; and (3) Arms hanging straight down, with the palms of the hands toward the legs.

The child was instructed to move forward with a heel-to-toe progression. When the end of the beam was reached, the child turned around, without getting off the board, and repeated the performance. Four round trips constituted each single training period.

The balancing board was a twenty-inch square of 5/8 inch plywood. It was centered on a block of wood three inches wide and four inches high. The child was instructed to stand on the board barefooted, with his feet spread apart. He then proceeded to rock the board, maintaining his balance with his arms. A session on the balancing beam lasted no more than five minutes with a break. Table I shows the time allotment per week for each training procedure.

TABLE I

WEEKLY SCHEDULE OF PERCEPTUAL-MOTOR TRAINING IN THE WINTER HAVEN PROGRAM RUN FROM MARCH 10, 1969 THROUGH APRIL 28, 1969

Activity	Monday	Tuesday	Wednesday	Thursday	Friday
Template tracing on paper	table templates (15 min.)		table templates (15 min.)		table templates (15 min.)
Copying on forms A and B		circle and oval (10 min.)		triangle square rectangle (10 min.)	
Templates on board		circle and oval (10 min.)		triangle square rectangle (10 min.)	
Walking beam	one session (10 min.)		one session (10 min.)		one session (10 min.)
Balance beam	one session (10 min.)		one session (10 min.)		one session (10 min.)

CHAPTER IV

RESULTS OF THE STUDY

The areas of readiness which were of particular concern in this study were those which measured skills in visual perception. The results of the tests given to each child were analyzed in three ways; total test, subtests, and subtests of specific areas of readiness together. Only after individually analyzing the raw mean gain scores received by each child on each part of each test, did total scores obtained have significant meaning.

Table II was a comparison of the mean raw gain scores of forms B and A of the MRT. The difference of the mean raw score of group C was compared with that of group E. Table III also illustrates the mean raw gain scores between both forms of the MRT. However, this table displays individual, rather than group scores. Student 1 in group C was compared with student 1 in group E.

In both of these tables, the mean raw gain scores for each subtest of the MRT were listed. Those subtests are the following: (I) Word meaning; (II) Listening; (III) Matching; (IV) Alphabet; (V) Numbers, and (VI) Copying. Obviously some of these areas of readiness were more related to visual perception than others. For example, matching one picture, figure, or shape with another required the ability to see the form and distinguish certain identical details. Before a child was able to copy a given figure or shape, he had to be able to visually study the original. Therefore, the subtests which measured the matching and copying skills of a child were of particular interest in the area of visual

TABLE II

COMPARISON OF MEAN RAW GAIN SCORES BETWEEN TWO FORMS OF THE METROPOLITAN READINESS TEST OF GROUP C (CONTROL) AND GROUP E (EXPERIMENTAL)

Group	Subtests of the Metropolitan Readiness Test*					
	I	II	III	IV	V	VI
$\bar{X}_C$	.60	-.80	0	2.00	3.40	2.20
$\bar{X}_E$	.40	.80	3.00	-.40	2.60	3.00

TABLE III

COMPARISON OF INDIVIDUAL MEAN RAW GAIN SCORES BETWEEN FORMS B AND A OF THE METROPOLITAN READINESS TEST

Individuals	Subtests of the Metropolitan Readiness Test*					
	I	II	III	IV	V	VI
C_1	4	0	-3	0	6	-1
E_1	-4	-2	1	1	-2	2
C_2	2	-6	-2	3	3	4
E_2	-3	0	5	4	6	0
C_3	-2	-1	3	6	-1	0
E_3	2	3	3	-2	2	-1
C_4	0	-1	2	1	2	8
E_4	3	-2	4	-2	6	8
C_5	-1	4	0	0	7	0
E_5	4	5	2	3	1	6

* I - Word Meaning II - Listening III - Matching
IV - Alphabet V - Numbers VI - Copying

perception. The remaining subtests including word meaning, listening, the alphabet, and numbers, measured another aspect of reading readiness. It was interesting to note whether or not the children who improved in subtests III and VI also improved in subtests I, II, IV, and V. Table IV compared the mean raw gain scores of parts I, II, IV, and V of the MRT with those of parts III and VI of each group, while Table V illustrated this comparison with each individual of groups C and E.

Since the Frostig Test of Visual Perception was used as a means to match the students at the beginning of the study, it was also interesting to note whether or not the students in group C remained as closely matched with those in group E after form B of the MRT as they did after the Frostig test. Table VI made this comparison.

Before any interpretations were made about the results of these tests, it was necessary to observe all of the raw scores of each child, on each test. These are listed in the appendix.

TABLE IV

COMPARISON OF GROUP MEAN RAW GAIN SCORES OF SUBTESTS 1, 2, 4, AND 5 VERSUS SUBTESTS 3 AND 6 OF THE METROPOLITAN READINESS TEST, FORMS B AND A

Group C	$\bar{X}_B$*	$\bar{X}_A$	X Gain
Parts 1, 2, 4, 5	8.45	9.75	1.30
Parts 3, 6	5.90	7.00	1.10

Group E	$\bar{X}_B$	$\bar{X}_A$	X Gain
Parts 1, 2, 4, 5	7.40	8.25	.85
Parts 3, 6	4.70	7.70	3.00

*Form A of the Metropolitan Readiness Test is given every spring to all kindergarten children in the Salina School System. The resulting data is tabulated city-wide, thus it was necessary to give Form B as the pre-test to those children participating in this study.

TABLE V

COMPARISON OF INDIVIDUAL MEAN RAW GAIN SCORES OF SUBTESTS 1, 2, 4, AND 5 VERSUS SUBTESTS 3 AND 6 OF THE METROPOLITAN READINESS TEST, FORMS B AND A

Group C				Group E			
Student	$\bar{X}B$	$\bar{X}A$	$\bar{X}$ Gain	Student	$\bar{X}B$	$\bar{X}A$	$\bar{X}$ Gain
C_1				E_1			
1, 2, 4, 5	7.00	9.50	2.50	1, 2, 4, 5	8.25	6.50	-1.25
3, 6	4.50	2.50	-2.00	3, 6	5.00	6.50	1.50
C_2				E_2			
1, 2, 4, 5	9.25	9.75	.50	1, 2, 4, 5	5.00	6.75	1.75
3, 6	7.00	8.00	1.00	3, 6	5.00	7.50	2.50
C_3				E_3			
1, 2, 4, 5	8.75	9.25	.50	1, 2, 4, 5	5.00	6.25	1.25
3, 6	5.00	6.50	1.50	3, 6	8.00	9.00	1.00
C_4				E_4			
1, 2, 4, 5	8.75	9.25	.50	1, 2, 4, 5	8.25	9.50	1.25
3, 6	4.00	9.00	5.00	3, 6	2.50	8.50	6.00
C_5				E_5			
1, 2, 4, 5	8.50	11.00	2.50	1, 2, 4, 5	10.50	12.25	1.75
3, 6	9.00	9.00	0	3, 6	3.00	7.00	4.00

TABLE VI

COMPARISON OF MATCHED INDIVIDUALS FROM TEST RESULTS

Group C		Group E	
Student		Student	
	Frostig = 94		Frostig = 95
C_1	MRT (B) = 37 (19th %ile)	E_1	MRT (B) = 43 (27th %ile)
	MRT (A) - 53 (46th %ile)		MRT (A) = 39 (22nd %ile)
	Frostig - 98		Frostig - 96
C_2	MRT (B) = 51 (42nd %ile)	E_2	MRT (B) = 30 (11th %ile)
	MRT (A) = 55 (51st %ile)		MRT (A) = 42 (26th %ile)
	Frostig = 102		Frostig = 108
C_3	MRT (B) = 45 (31 %ile)	E_3	MRT (B) = 37 (19th %ile)
	MRT (A) = 50 (40th %ile)		MRT (A) = 43 (27th %ile)
	Frostig = 102		Frostig = 100
C_4	MRT (B) = 43 (27th %ile)	E_4	MRT (B) - 38 (20th %ile)
	MRT (A) = 45 (31st %ile)		MRT (A) = 55 (51st %ile)
	Frostig = 102		Frostig = 104
C_5	MRT (B) = 52 (42nd %ile)	E_5	MRT (B) = 48 (36th %ile)
	MRT (A) = 62 (51st %ile)		MRT (A) = 63 (67th %ile)

CHAPTER V

INTERPRETATIONS, CONCLUSIONS, AND RECOMMENDATIONS

Chapter IV presented the results of each test used in the study in tabular form as a means of evaluation. Chapter V interprets these results individually, draws conclusions, and presents recommendations based on the previous interpretations.

Table II indicated a strong gain in the areas of visual perception (subtests III and VI) for the group involved in the Winter Haven program, while the control group made no gain in the area of matching, and less gain than group E in the area of copying. This seems to be important as the other subtest results of both groups made similar gains.

In Table III only students C_3 , C_4 , E_3 and E_4 appeared to make equal gains in the areas of visual perception (subtests III and VI). However, their gains in other areas were not as closely related. The negative gain scores typify the erratic test performance ability often observed in low-average students such as these. Additional emotional and maturational problems may complicate this student's test performance one day and not affect it on another day.

In Table II it was observed that C_5 made no gains in the two areas of matching and copying. This child was left-handed and nearly always made reversals when drawing and writing his name or copying a pattern with the parquetry blocks. E_5 showed more gain in the copying subtest than in the area of matching. This child had the ability to "see" differences and similarities in shapes and could make the "X" on the two forms alike with little difficulty. However, at the beginning of the Winter Haven program, he had no coordination or control of his large and small muscles, the latter of which are a necessary part of the copying process. For several days, this child could not walk even part way across the balance board without falling. Within three weeks he was able to make as many round trips as he was told to make. He had learned how to control the parts of his body and seemed to become a happier, less frustrated child in the classroom.

In Table IV the mean raw gain score of parts III (matching) and VI (Copying) were much larger in the experimental group than in the control group. This possibly indicates some influence of a perceptual-motor program, since the gains made of both groups in areas of word meaning, matching, alphabet, and numbers, parts I, II, IV, and V, respectively, were closer. One should note that the scores of parts II and VI of the post-test of group E were not much higher than those of group C. The gain was high in E because the mean raw score of the pre-test was lower in E than in C. However, the mean raw scores of Parts I, II, IV, and V were also lower in group E than group C, and still the gain scores were not as high. Thus, motor practice was possibly a significant factor in those areas of motor coordination and perception.

When breaking the MRT into subtests and looking at each student's gain scores separately, as was done in Table V, it was noted that nearly every child in both groups obtained a much larger gain in the areas of visual perception than the other areas of the test. It was also noted that the gain was more significant among those pupils involved in the Winter Haven program than among those of the control group. This program, being the only variable which was not present in the control group, also appears to be a factor influencing the mean raw gain scores in the area of visual perception.

Although parts of the MRT are similar to the Frostig test, it cannot be concluded that both tests are equivalent in measuring visual perceptual skills. For example, on Table VI, C_2 and E_2 appeared to be closely related in their performances on the Frostig test. Yet when looking at the pre-test of the MRT, E_2 ranked in a much lower percentile than did C_2. The same was true in the MRT post-test results. However, when referring to Table V, it was noticed that the discrepancy seemed to be caused by subtests other than those involving visual perception.

It was this same factor that caused students E_3 and E_5 to rank higher than C_3 and C_5 on both forms of the MRT. These students ranked lower on the MRT as a result of more difficulties in other areas of readiness such as vocabulary, listening, alphabet, and numbers.

Although the indications are present, it is difficult to make any valid conclusions in a study such as this because of the small sample and the limited amount of time involved. Also between the ages of five and seven, children are experiencing a rapid spurt in maturational growth, which would greatly affect performance just as would a slight lag in maturity.

In any future study more valid results might be obtained if students of average and slightly below average ability were involved, thus reducing the influence of emotional and maturational problems which are often prevalent in the students of low average and under ability.

It would be essential to continue a follow-up study on each of the students in both groups as they enter first grade and beginning reading, before a successful program can be substantiated from the positive indications thus far.

Despite these limitations, this study did at least reveal favorable effects among those students who participated in the Winter Haven program. For each of those students, evidence of the following was observed: (1) increased perceptual ability in those activities requiring visual skills; (2) improved coordination of both the large and small muscles of the body; and (3) elevation of self-concept in social interaction in the classroom as a result of more confidence in body control.

If such a basic and easily administered program of perceptual-motor instruction can enhance, even slightly, the learning ability of a child, it would seem most logical to incorporate such a program in the kindergarten classroom before detrimental reading habits have become established.

The author predicts that in the future the establishment of perceptual-motor programs in the classroom will become more than a trend in kindergarten education.

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APPENDIX

TABLE VII

RAW SCORES OF GROUP C (CONTROL GROUP)

Student	Frostig Test of Visual Perception	MRT (Form B)		MRT (Form A)	
C_1	Total = 94	I - 6	Age:	I - 10	Age:
	I - 7	II - 9	5-11	II - 9	6-1
	II - 9	III - 5	Score:	III - 2	Score:
	III - 9	IV - 5	37	IV - 5	53
	IV - 9	V - 8	%ile:	V - 14	%ile:
	V - 11	VI - 4	19th	VI - 3	46th
C_2	Total = 98	I - 8	Age:	I - 10	Age:
	I - 10	II - 14	5-9	II - 8	6-0
	II - 11	III - 9	Score:	III - 7	Score:
	III - 8	IV - 6	51	IV - 9	55
	IV - 9	V - 9	%ile:	V - 12	%ile:
	V - 9	VI - 5	42nd	VI - 9	51st
C_3	Total = 102	I - 9	Age:	I - 7	Age:
	I - 11	II - 12	5-6	II - 11	5-9
	II - 9	III - 6	Score:	III - 9	Score:
	III - 11	IV - 3	45	IV - 9	50
	IV - 8	V - 11	%ile:	V - 10	%ile:
	V - 10	VI - 4	31st	VI - 4	40th
C_4	Total = 102	I - 6	Age:	I - 6	Age:
	I - 10	II - 12	5-5	II - 11	5-8
	II - 8	III - 7	Score:	III - 9	Score:
	III - 11	IV - 6	43	IV - 7	45
	IV - 10	V - 11	%ile:	V - 13	%ile:
	V - 10	VI - 1	27th	VI - 9	31st
C_5	Total = 102	I - 7	Age:	I - 6	Age:
	I - 11	II - 8	5-5	II - 12	5-8
	II - 9	III - 11	Score:	III - 11	Score:
	III - 11	IV - 7	52	IV - 7	62
	IV - 8	V - 12	%ile:	V - 19	%ile:
	V - 10	VI - 7	44th	VI - 7	65th

TABLE VIII

RAW SCORES OF GROUP E (EXPERIMENTAL GROUP)

Student	Frostig Test of Visual Perception	MRT (Form B)		MRT (Form A)	
	Total = 95	I - 10	Age:	I - 6	Age:
	I - 10	II - 8	5-7	II - 6	5-9
	II - 9	III - 3	Score:	III - 4	Score:
E_1	III - 10	IV - 4	43	IV - 5	39
	IV - 6	V - 11	%ile:	V - 9	%ile:
	V - 10	VI - 7	27th	VI - 9	22nd
	Total = 96	I - 4	Age:	I - 1	Age:
	I - 10	II - 8	5-9	II - 8	6-0
	II - 8	III - 5	Score:	III - 10	Score:
E_2	III - 10	IV - 0	30	IV - 4	42
	IV - 9	V - 8	%ile:	V - 14	%ile:
	V - 9	VI - 5	11th	VI - 5	26th
	Total = 108	I - 5	Age:	I - 7	Age:
	I - 10	II - 6	5-8	II - 9	5-11
	II - 9	III - 8	Score:	III - 11	Score:
E_3	III - 12	IV - 5	37	IV - 3	43
	IV - 7	V - 4	%ile:	V - 6	%ile:
	V - 14	VI - 8	19th	VI - 7	27th
	Total = 100	I - 6	Age:	I - 9	Age:
	I - 10	II - 9	5-5	II - 7	5-8
	II - 10	III - 2	Score:	III - 6	Score:
E_4	III - 10	IV - 9	38	IV - 7	55
	IV - 10	V - 9	%ile:	V - 15	%ile:
	V - 8	VI - 3	20th	VI - 11	51st
	Total = 104	I - 8	Age:	I - 12	Age:
	I - 9	II - 5	5-11	II - 10	6-2
	II - 13	III - 4	Score:	III - 6	Score:
E_5	III - 10	IV - 15	48	IV - 12	63
	IV - 9	V - 14	%ile:	V - 15	%ile:
	V - 9	VI - 2	36th	VI - 8	67th

TABLE IX

AGE EQUIVALENT SCORES RECEIVED BY GROUP C ON THE FROSTIG DEVELOPMENTAL TEST OF VISUAL PERCEPTION

Pupil	Age*	Subtests**				
		I	II	III	IV	V
C_1	5-7	4-0	5-0	5-0	4-9	6-0
C_2	5-5	5-3	6-0	4-0	4-9	4-9
C_3	5-3	5-3	4-9	4-6	4-9	4-9
C_4	5-2	5-0	3-9	6-0	4-9	4-9
C_5	5-3	6-0	4-6	6-0	4-0	5-6

TABLE X

AGE EQUIVALENT SCORES RECEIVED BY GROUP E ON THE FROSTIG DEVELOPMENTAL TEST OF VISUAL PERCEPTION

Pupil	Age*	Subtests**				
		I	II	III	IV	V
E_1	5-4	5-3	4-9	5-6	3-3	5-0
E_2	5-6	5-3	4-3	6-0	4-9	4+9
E_3	5-6	5-9	4-9	6-9	4-0	7-6
E_4	5-2	5-0	4-9	5-0	5+0	4-0
E_5	5-8	5-0	7-0	6-0	5-0	5-0

*Age at time test was taken.
**I - Visual Motor. II - Figure-Ground. III - Form Constancy. IV - Position in Space. V - Spatial Relations.

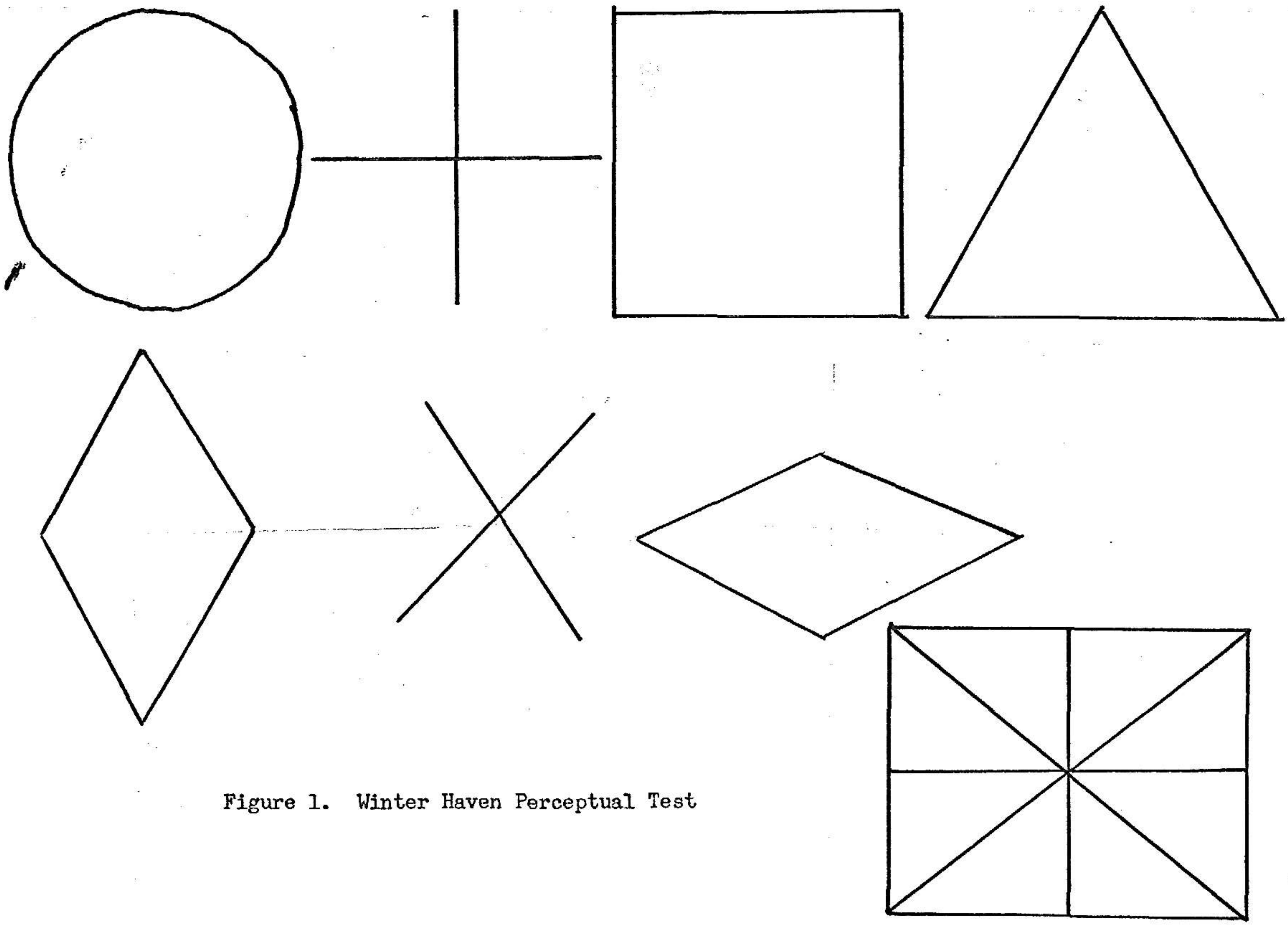

Figure 1. Winter Haven Perceptual Test

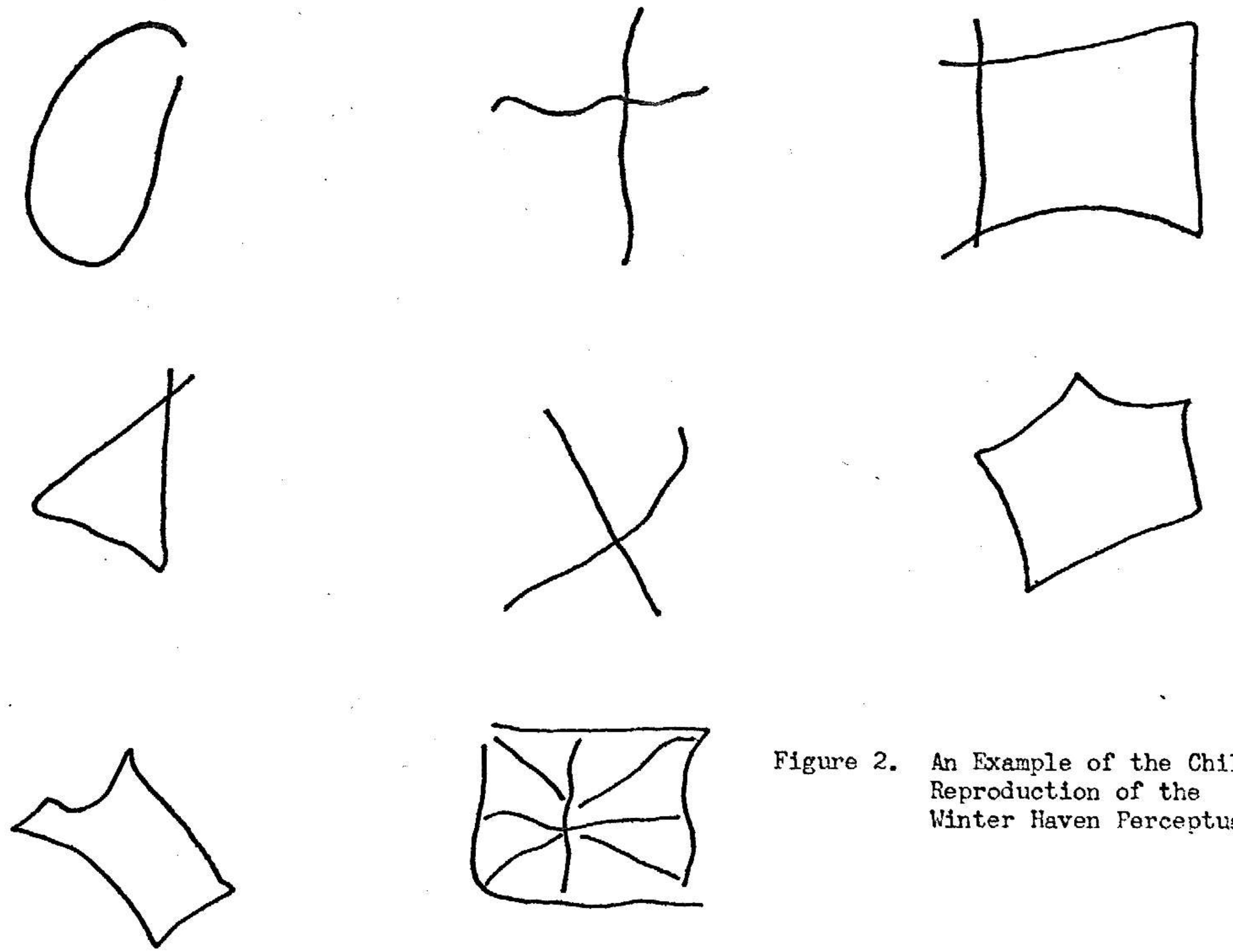

Figure 2. An Example of the Child's Reproduction of the Winter Haven Perceptual Test.

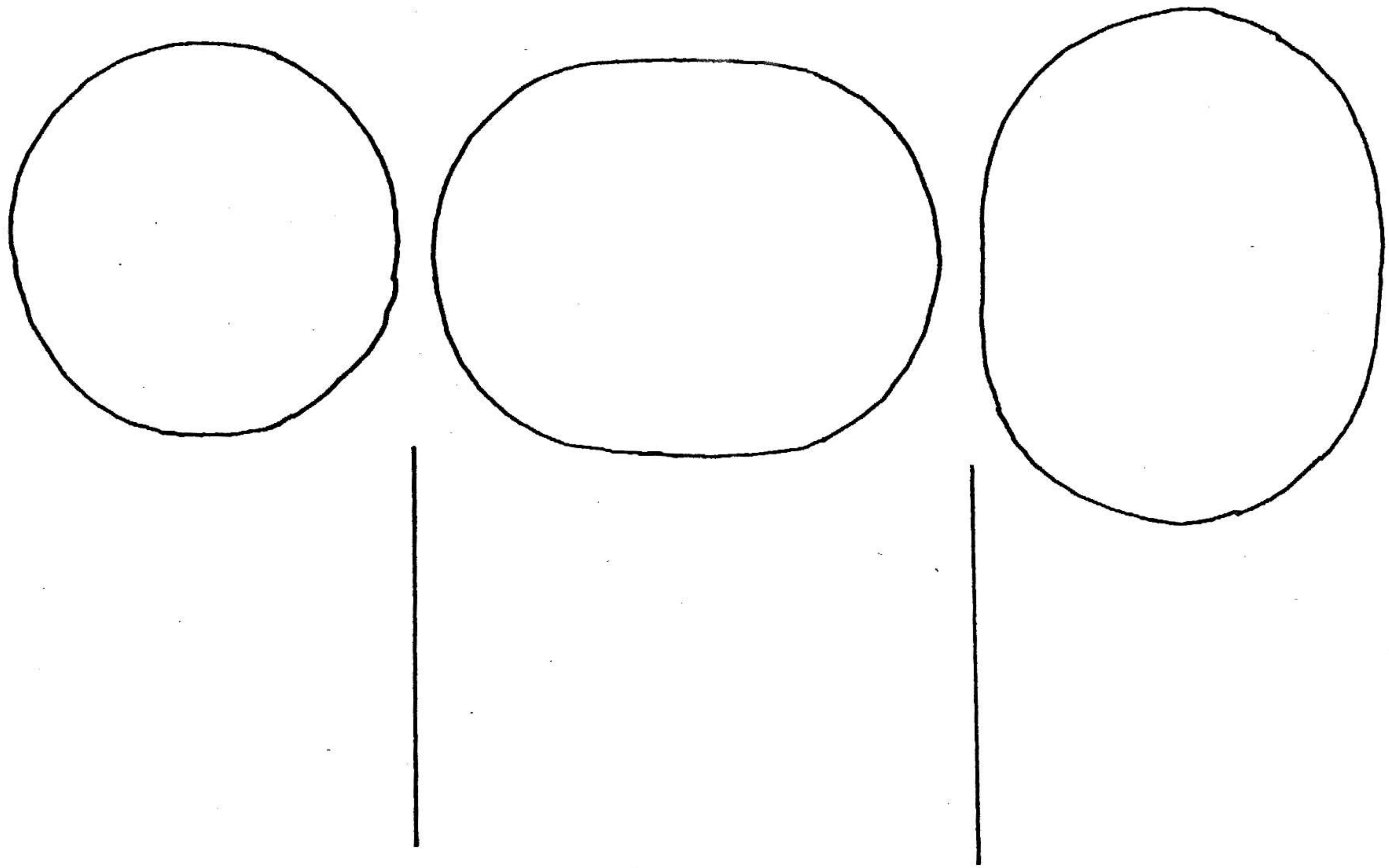

Figure 3. Training Form A

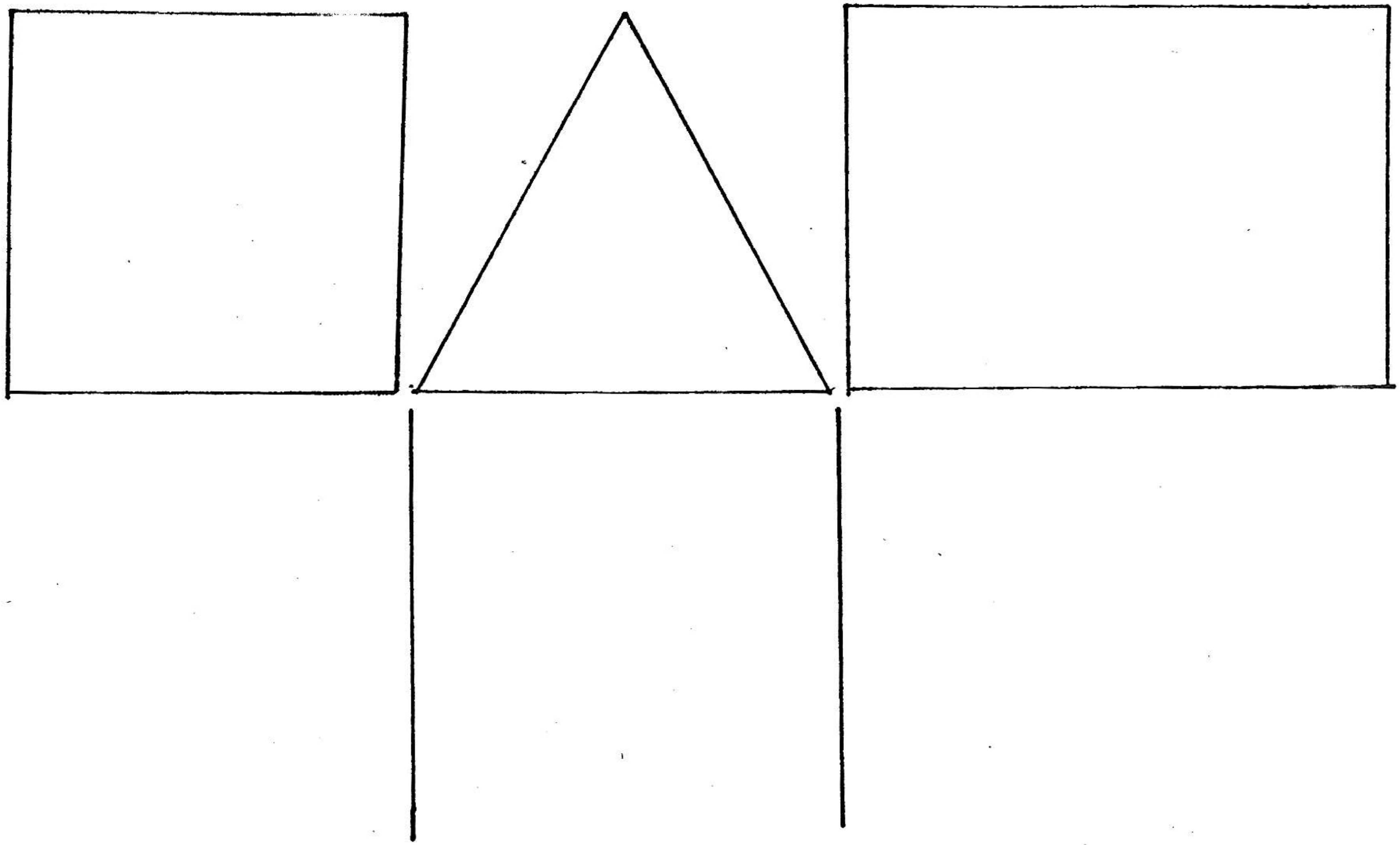

Figure 4. Training Form B

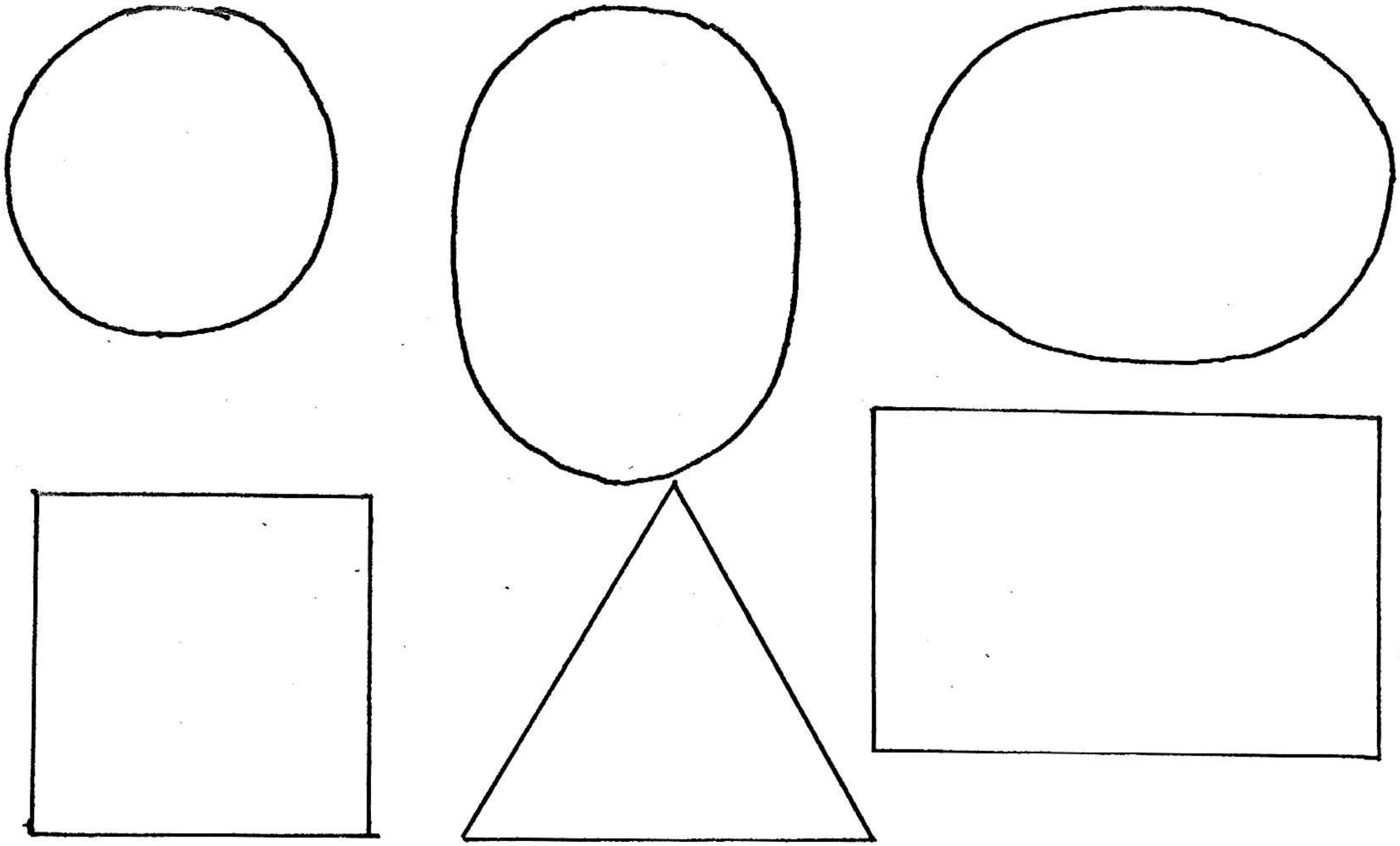

Figure 5. An Example of a Multiple Template

THE EFFECTIVENESS OF A PERCEPTUAL-MOTOR APPROACH TO DEVELOPING READING READINESS IN KINDERGARTEN CHILDREN

by

LAVINA JANE ZOOK

B. S., Kansas Wesleyan University, 1967

AN ABSTRACT OF A MASTER'S REPORT

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requirements for the degree

MASTER OF SCIENCE

College of Education

KANSAS STATE UNIVERSITY

Manhattan, Kansas

1969

Bibliography. A study of the Effectiveness of a Perceptual-Motor Approach to Developing Reading Readiness in Kindergarten Children.

Purpose. It was the purpose of this study (1) to use a highly structured perceptual-motor approach to reading readiness with kindergarten children; (2) to present an unstructured approach to reading readiness to another group of kindergarten children; and (3) to compare the progress in reading readiness of these two kindergarten groups through the use of pre- and post-standardized tests.

The perceptual-motor program administered to the experimental group was the Winter Haven (Florida) Perceptual-Motor Program.

Rationale. The Winter Haven Research Foundation concludes that achievement in visual-motor skills is, in part, a product of learning. While maturation may be the pace-setter, the type of instructional program used in this program produces significant achievement in the learning of visual-motor skills. Furthermore, if kindergarten pupils' perceptual readiness is improved significantly by specific visual-motor training serious consideration can be given to the incorporation of visual-motor activities in a pre-reading program.

Results and Conclusions. This study revealed favorable effects among those students who participated in the Winter Haven program. For each of those students, evidence of the following was observed:

(1) Increased perceptual ability in those activities requiring visual skills.

(2) Improved coordination of both the large and small muscles of the body.

(3) Elevation of self-concept in social interaction in the classroom as a result of more confidence in body control.

The author predicts that in the future the establishment of perceptual-motor programs in the classroom will become more than a trend in kindergarten education.