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EFFECTS OF A SYSTEMATIC-MOTOR REINFORCEMENT EXPERIENCE
ON ALPHABET LETTER DISCRIMINATION TASKS
BY PRESCHOOL CHILDREN

by

Jean Wilson

A thesis submitted in partial fulfillment
of the requirements for the degree

of

MASTER OF SCIENCE

in

Child Development

Approved:

Major Professor

Committee Member

Committee Member

Dean of Graduate Studies

UTAH STATE UNIVERSITY
Logan, Utah

1970

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Jean Wilson

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ABSTRACT

Effects of a Systematic-Motor Reinforcement Experience
on Alphabet Letter Discrimination Tasks

by Preschool Children

by

Jean Wilson, Master of Science

Utah State University, 1970

Major Professor: Dr. Carroll Lambert
Department: Family and Child Development

The purpose of this study was to determine if an experimental group of children would make significant improvements in their ability to discriminate and order alphabet letters after a systematic reinforcement program of sensori-motor experiences with letters.

The study involved tactual manipulation in learning the discrimination of, the order of, and the position of the alphabet letters in the child's own name.

The hypotheses were made:

1. There will be a significant difference between the experimental population and the control population with respect to the ability to order and place in sequence the letters in each child's name, after the completion of a systematic program of sensori-motor experience.

2. There will be a significant difference between the experimental population and the control population with respect to visual-perceptual discrimination, or positioning, after the completion of a systematic program of sensori-experience.

Twenty four children, 12 in an experiemntal group, 12 in a control group, six boys and six girls, between the ages of three years and six months and four years and six months were selected at random from the Utah State University Laboratories. Preceeding the actual collection of data a pilot study was conducted on a similar group of 12 children using the proposed pretest.

During the free-play in the Laboratory, each child was asked to go with the author to play a game. The first time with the author, and prior to the pretest, the child was given a brightly colored stacking cone to manipulate for the purpose of establishing rapport and self-confidence within the child. Each child in the experimental and control groups was given a pretest to test the ability to discriminate and order letters from in their own first name. The experimental group received a systematic sensori-motor experience twice a week dealing with letter discrimination. The control group received no experience in letter manipulation after the pretest. Each child set his own pace and was given the post-test only when he stated he was ready. At the time the majority of the experimental group was receiving their post-test the control group received theirs.

The findings support both hypotheses with the difference of the experimental group and the control group showing significance at the .05 level for hypothesis one and between .05-.01 level for hypothesis two.

(65 pages)

CHAPTER I
INTRODUCTION

Every child is confronted with learning a complex symbol system, the alphabet, and with learning to order these symbols in sequence and position to form words before he learns to read. The mastery of these perceptual skills is basic to the more complex skills of reading.

Gotkin (1967) has stated that most middle class children are well on their way to mastery of the alphabet before entering kindergarten and teaching that alphabet to them is often unnecessary.

However, in a pilot test by Leona Peters (1970), involving a random sample of five middle class children from the Edith Bowen Summer Session Laboratory Kindergarten class, Logan, Utah, the following results were found.

Each child was given an envelope containing the letters of his first name. The children were instructed to use the letters to spell their own first name.

	<u>Years</u>	<u>Months</u>	
Jenny	4	6	<u>Jenny</u>
Angie	4	8	<u>i9gnA</u>
Nancy	4	9	<u>yncaN</u>

	<u>Years</u>	<u>Months</u>	
Craig	5	3	<u>p C i a h</u>
Dean	5	4	<u>G p h e</u>

This sample indicates that four of the five children were unaware of the order and the position of the abstract symbols that are used to build their own first name.

Piaget (1952) has repeatedly emphasized the importance of sensori-motor activity to develop the child's perceptual abilities. He has also made clear the importance of visual and tactual exploratory movements. Churchill agrees with Piaget further stating that:

Every new experience, every sensori-motor reaction makes links with comparable experience already registered. Every sensation mediated by the eye is caught and registered on inner structure, so also every movement sensation, every sound attended to, every touch. In this way cell assemblies of knowledge are being built into the mental life of the child . . . information about the shape and size of things, the relation between one event and another, and so on. (Churchill, 1958, p. 36)

Piaget suggests that what is learned at any given point is, at least in part, determined by what has gone on before, not merely by what the child has experienced, but more by the elements to which he has paid attention. This would certainly suggest the importance of any sensori-motor experience dealing with new knowledge or building upon previously learned ideas.

Statement of the Problem

The problem to be investigated in this study has been to examine the impact of a sensori-motor activity involving visual and tactual exploratory movements, on the development of perceptual abilities among children who are in what Piaget has described as the sensori-motor stage of development. Children at this developmental level are thought to function and learn best through concrete rather than abstract operations, and to be helped to learn through activities which provide learning reinforcement through the utilization of more than one sense.

Objectives

The purpose of this study has been to determine if an experimental group of children who participate in a systematic reinforcement program of sensori-motor experiences with three dimensional letters would be able to make significantly greater improvements in their ability to discriminate and order the letters in their own name than was true of a control group of children which did not participate in the reinforcement program.

Hypotheses

The following hypotheses were made in this study:

1. There will be a significant difference between the experimental population and the control population with respect to the ability to order and

place in proper sequence the letters in each child's own name, after the completion of a systematic program of sensori-motor experience by the experimental group.

2. There will be a significant difference between the experimental population and the control population with respect to visual-perceptual discrimination, or positioning, after the completion of a systematic program of sensori-motor experience.

CHAPTER II.

REVIEW OF LITERATURE

Visual Perception

Hill (1969, p. 418) feels an "increasing use of the visual sense has been shown to occur at an early age in normal children." Schopler (1966) found that the most striking increase in visual exploration occurs between three and six years of age. Rudel and Teuber (1964), investigating cross-modal transfer between visual and tactual modalities by four and five years olds, on a recognition task, found that the order of difficulty for them was visual-visual (easiest), then visual-tactual, then tactual-visual, and last tactual-tactual (hardest).

Piaget (1960) has found through a project designed to study the perception of intersecting and incomplete forms that after four years of age, with unswerving accuracy, children could recognize intersecting forms. At age nine they recognize incomplete forms. He based the study on his theory that:

The complex of operations which have the characteristic of a Gestalt or "structure d'ensemble" are not preformed or innate in an individual. They actually evolve out of a history of a person's interaction with the environment, enabling him to use new experiences in terms of his past (assimilation) and to re-arrange his response in terms of the demands of the environment (accommodation). Early in life the child acts without understanding or comprehension. It is the immediacies of his experience that fills his awareness. An example of this perceptual phenomenon is the young child's grasping of a geometric form and attempting

to place it on a puzzle cutout that has no relationship to the size or shape of the form. The grasp response is perceptual and motor; whereas, the placement of the correct form in its proper spot is an aspect of the higher mental processes and comes later when the youngster is able to free himself from the preoccupation with the shape and notices similarities and makes generalizations concerning proper placement. (Piaget, 1960, p. 17)

Pufall and Furth (1966) are credited with two studies investigating recognition and learning of visual sequences in four to six year old children. Experiment I with 20 children aged four, five, and six, demonstrated that four year old children could match sequences and that for all ages performance improved when sequences were perceptually present. Experiment II reported tasks of learning associate responses to sequences. Thirty-six children were used, 12 fours, 12 fives, and 12 sixs. On successively presented sequences, no children succeeded at age four. The fact that these results occurred even though training had been given suggests that four year old children are not likely to internally construct or maintain sequences without perceptual support.

Cohen (1969) asks the question whether visual perceptual games or training relevant to reading or learning how to read are valuable. To explore this he gave the Frostig Development Test of Visual Perception (DTVP) to 120 first graders randomly selected from a New York disadvantaged area. The children were given perceptual training programs as preventative and/or remedial treatment. There were no changes found in reading achievement. Cohen questions what is really being measured with perceptual instruments.

He feels they measure behavior that relates somewhat to the demands of non-verbal IQ tests. He states that "visual perceptual games are important if you are testing or trying to improve visual perception or IQ. But in the reading field, the surest way to get urban ghetto kids to read is to teach them letters and words and to do it thoroughly." (Cohen, 1969, p. 503)

Getman (1970, p. 504) in a critique response to Cohen agrees with what he says. However, he feels that "you need to be careful with what you consider as a 'perceptual game' and that it doesn't relate to perceptual awareness of letters etc." After all "the actual relationship between comprehension and perception is a whole lot more than recognition and mouthing of letters and words."

Bateman (1970) responded to Cohen favorably stating that his conclusions, while not currently popular, are making rapid headway in becoming more generally accepted.

Letter Discrimination

There are many skills prerequisite to achievement in reading letters. One important skill is the ability to discriminate visually between differences in forms and objects. The child must be able to differentiate between letters which are visually similar if he is to succeed in learning the alphabet (Smith, 1968).

In order to learn, a child must be able to attend to relevant stimuli, to select those stimuli that pertain to the present situation, to organize the

incoming stimuli by associating them with other stimuli, to respond suitably, and to use the responses as feedback for the interpretation and modification of subsequent experiences. In order for this process to occur, an individual must have perceptual sensitivity, selectivity, and stability. As the child takes in more stimuli, he becomes more selective and perceptive in sorting out the relevant stimuli. He therefore becomes a more efficient and effective learner (Smith, 1968).

"Visual discrimination diagnostic tests may provide a better indication of the child's ability to read if letters and words . . . are employed in their construction." (Goldstein, Moss and Jordan, 1965, p. 86)

"Children only slowly develop the capacity to perceive accurately the details of relatively complex shapes and the exact relationships of their parts." (Vernon, 1966, p. 459)

That young children have little natural tendency to analyze shapes into their constituent details was shown by Ames et al. (1953) with the Rorschach ink-blots. The shapes of the blots were responded to as wholes, but vaguely and inaccurately, by children under three years; though some organization of parts began at three to four years.

Thirty-six kindergarten children and 24 nursery school children with a median age of five years and five months were distributed among three groups of Samuels and Jeffrey (1966). Using the paired-associate anticipation method, each group was taught one of three lists of words that differed in

discriminability. Discriminability was determined by the number of different letters, either four, six, or eight, used to construct four two-letter words. It was hypothesized that the more discriminable the list, the faster the learning rate but the greater the probability that the children would learn on the basis of single letters. The hypothesis concerning learning rate was confirmed with $p < .01$. After the four and eight-letter groups were brought to the same criterion, the eight-letter group was found to identify words on the basis of single letter cues significantly more often ($p < .02$) than the four-letter group, thus confirming the second hypothesis as well. Results of this study show that the number of children who make identification on the basis of a single letter increases with the number of letters on which they were trained. Thus, as hypothesized, training that forces attention to each letter is less likely to lead to subsequent reading errors than training which permits the child to identify words on the basis of a single feature.

In an earlier study, Samuels and Jeffrey (1965) found that when children are given letter training first, subjects had much less difficulty identifying the words in a list of four-letter words than children which were given word training with the words in a list of six-letter words prior to learning the four-letter word list.

Marchbanks and Levin (1965, p. 59) found "that letters were used more often than word shape as a cue for recognition."

Together, these studies suggest that, in teaching children to read, it is important that the child learns to attend to all of the letters. This can be

accomplished by either specific letter training or it may be accomplished by giving them experience with highly similar words which forces identification on the basis of more than a single stimulus feature.

King (1964) compared six groups of (23 each) kindergarten children learning to read four words following different kinds of visual discrimination training. Each group was designated by the method presentation and type of stimuli used in training. Five groups were trained with successive presentations and one group with simultaneous presentations. The types of stimuli used for discrimination training included different words from the reading task, different meaningful words (presentation of visual form, sound, and picture), same words as reading task, same letters which were constituents of reading words, and geometric forms for the control group. Results of analysis of variance indicated significant group differences in reading performance favoring groups trained in matching different meaningful words and the same letters.

These findings suggest that pre-reading programs could usefully be modified to include visual discrimination training with the easier task of matching single letters to be followed by the more difficult but effective training in discriminating words made meaningful by associating the appropriate sounds and meaning to the visual forms (King, 1964).

Twenty-four children between the ages of 47 and 56 months were given a set of matching-from-sample trials which required them to differentiate an outline figure from its up-down or left-right reversal (Wohlwill and Wiener, 1964). The results show conclusively that children as young as four to five

years old have little difficulty, on the average, in discriminating stimuli on the basis of their spatial orientation, provided the task requires a response to this cue. The failure of the three year olds to respond to the task leaves open the question of the ability of very young children to respond to the orientation of stimuli. However, the results obtained with letter-like forms by Gibson, Gibson, Pick, and Osser (1962) likewise show that from the age of five years on children are able to differentiate a shape from its left-right or up-down reversal with a degree of consistency.

The problem in reading, however, involves more than the differentiation of shapes from their reversals. In learning the alphabet, or in beginning reading, the child has to learn to associate a set of differential responses, the names of the letters, or the sounds of the words, to the stimuli. Hendrickson and Muehl (1962) have shown that the use of the name of letters as stimuli, helps correct error of such letters as b, d, p, and q.

Zeitz (1966) tells of a new and exciting alphabet devised by John R. Malone, executive director, the Foundation for a Compatible and Consistent Alphabet, Chicago, Ill. It is called Unifon, the sound alphabet. The new alphabet uses 23 standard Roman capital letters, 12 others that are altered, and five new configurations. Forty symbols, forty sounds. Zeitz states that small children with their limited visual discrimination and muscle control can more readily read and write in this simple media. Unifon employs only capital letters. Some users of Unifon experienced reading achievement that is one year ahead of control groups of non-users. Some report more than a year's advance,

others less. All reported that Unifon students achieved more and did better earlier than non-users.

Another new alphabet being studied with young children is the I. T. A. or Initial Teaching Alphabet. This alphabet has 43 characters and was designed by Sir James Pitman (Southgate, 1965). Kresh (1969) compared the effectiveness of the Initial Teaching Alphabet and the Traditional Orthography in first grades in the Pittsburgh Public Schools. There were 562 students in the study. The results showed a statistical significance in favor of "ita." Chasnoff in 1967 studied the same two alphabets in first grades and found no significant difference.

Gotkin (1967) while doing research with the alphabet as a part of a larger research program dealing with discrimination skills underlying learning, developed an alphabet board for the purpose of introducing the alphabet as a sensori-motor experience, rather than as an abstract symbolic system. In designing the alphabet board for four and five year old children, it was felt that the type of experience which could be provided by the alphabet board would serve to familiarize a child with the shapes of alphabet letters, without requiring the child to cope simultaneously with sounds of letters. Furthermore, this familiarization could occur at an earlier age than is possible in formal reading instruction. Another reason for such a board was to enable the child to use another sense for learning, in this case touch as well as vision. A third reason such a board was good for was alphabet discrimination.

Gotkin (1967), using the alphabet board, studied the effects of the

number of different letters to be placed upon the amount of time which the child required to place them and upon the amount of difficulty experienced by the child. Two methods were introduced, a Gradual one with a few letters at a time being worked with and a Non-gradual one with all 26 letters being utilized. Children introduced to the board by the Gradual method required much less time and much less assistance than children introduced by the Non-gradual method.

Gesell and Ilg (1946) found that some identification of letters begins as early as four years of age.

Vernon (1957) states that the order of letters in words is a matter of indifference to young children. They have great difficulty in remembering the correct order. He feels that three and four year olds have not acquired the ability to understand the importance of particular details in letter shapes, their spatial position, and their relationship to one another within the total word shape. He feels that children learn at a fairly early stage to recognize the shapes of certain isolated letters; however, he feels that children under five, unless of a high intelligence, are not capable of discriminating shapes with sufficient accuracy to enable them to perceive the shapes of letters and words.

Montessori (1912) felt the importance of capitalizing on the curiosity of the child and by doing so that he would learn through his own exploration. Quite by accident she discovered the learning possibilities of letters out of sandpaper. She tried to emphasize the importance of sight as well as touch for learning in young children.

Gibson, Gibson, Pick and Osser (1962) studied the development of the ability to discriminate visually a set of letter-like forms, in children four through eight years of age, and related the types of errors made to certain critical features of letters. They hypothesized that certain distinctive features of letter patterns were responded to in the discrimination of letter-like forms. They suggested that "perspective transformations," "reversals and rotations," and "changes of line to curve" in their letter-like forms were highly confusing to the younger (four year old) children because such transformations are not distinctive features for object identification in the children's past experience, and that the two latter types of errors drop markedly as the children learn to read, because the children develop a sensitivity to these same distinctive features.

Popp's study (1964) verifies Davidson's (1931) and Smith's (1968) study of the discriminating of letters d, p, g, b, and concluded that reversals and inversions are the most frequent errors in letter discrimination.

Sensori-motor Performance

Three groups of children matched on the basis of intelligence and pre-kindergarten readiness were selected for this study (Kein, 1970). The experimental group followed prescribed visual-motor training procedures while the control group was given the traditional kindergarten program. This was to compare and determine the effects of a visual-motor program on the readiness and intelligence of kindergarten children. They were compared for

intelligence and readiness at the end of one year. There was no significant difference. The author of this study suggests further research is necessary before this visual-motor training program becomes a part of the general kindergarten curriculum.

Wolinsky (1965) views perception as an aspect of intelligence and investigated it as an important part of the sensori-motor period or of sensori-motor development. This she did on the basis of a study done by Piaget (1960) as to perception as a knowledge we have of objects. Wolinsky's study proved affirmative.

Research by Abravenel (1968) suggests that visual attention to spatial position appears earlier in development than haptic attention to spatial position. This study concerned correspondences of elementary attributes of spatial position (up-down, inside-outside, and upright vs. upside-down) between haptic and visual sense-modalities by young children. Children between the ages of three to six made cross-modal sameness-difference judgements and recognition matches in which accuracy required differentiating spatial position. Children aged three and four years showed little accuracy in sameness-difference judgements, whereas significant increases in accuracy were found by ages five and six. Abravenel discusses results of his study in terms of developments in perceptual activity and the process of intersensory integration. He feels that attributes of spatial position are still imperfectly attended to and grasped and are not readily transferred from haptic to vision, by three and four years of age.

Roach and Kephart (1966) postulated that for all individuals to integrate information, a continuous developmental pattern is necessary which consists of three stages or levels. The initial stage of development is that of motor-movement patterns. The second stage is perceptual organization. Roach and Kephart suggested that perceptual organization is built upon motor-movement patterns. The final stage in the hierarchical order is concept formation. All three of the stages were said to be interrelated and interdependent.

Alley and Carr (1968) did a study to determine if educable mentally retarded children make significant improvements in sensory-motor, visual-perceptual, and concept-formation activities after an extended, systematic training program of sensory-motor activities. No difference between pretest-post-test results of experimental and control group was shown to justify a need for a systematic sensory-motor program of this type.

Implicit in the Montessorian scope (Morra, 1967) is the assumption that the greater part of motivated behavior, in a learning situation, is accounted for by the child's pursuance of varied experiences. This view is generally referred to as the active model of motivation. Thus, the pre-school teacher should be involved mainly with the most effective ways of presenting varying stimulation across varying sensory modalities, so as to enhance optimal arousal. This state should provide for the child the necessary conditions for the maximal enhancement of the learning process.

A study by Henrickson and Muehl (1962) compared three groups of

kindergarten children (49 children in all) in learning names for the letters "b" and "d." An Attention-Consistent Motor group received pretraining in attending to the directional difference between the letters and making consistent motor responses to each letter. An Attention-Inconsistent Motor group received similar attention pretraining, but made inconsistent motor responses to each letter. An Irrelevant-Control group received attention and motor response pretraining to color stimuli. The findings showed that pretraining in attending to the directional differences between the letters "b" and "d" facilitated learning names for these same letters in a paired-associate transfer task. The findings also showed that pretraining in making a consistent motor response to the directional differences between the letters "b" and "d" did not add significantly to the transfer task performance.

Abravenel (1968) in his study of haptic and visual sense-modalities in young children noted that the section of the hand used for exploration differentiated the younger children from the older ones. Younger children used the palms of the hand considerably, whereas older children explored exclusively with fingers and fingertips. Accuracy increased with change from palm to finger exploration.

It would seem, by this study, that three and four year old children don't rely greatly on tactual exploration as they do on visual. By six and seven years of age more tactual exploration is evident.

A study done by Birch and Lofford (1963) used geometric forms to show whether children aged five to 11 scored fewer errors perceptually

when studying forms visual-haptically, visual-kinesthetically, or haptic-kinesthetically. The results showed strong evidence of the greater proficiency of children when using both haptic and visual perceptions to discriminate shapes and forms.

Birch and Lofford (1967) did another study exploring the child's ability to engage adequately in the different types of visual-perceptual activity which must occur as the perception of two-dimensional form is increasingly differentiated. Seventy-three boys and 72 girls were tested in terms of recognition, analysis, and synthesis. Results showed strong association between intersensory competence and the ability to engage in directed motor activity.

Walk and Gibson (1961) found that visual experience alone was relatively ineffective in the development of visual differentiation, but that visual experience conjoined with somesthetic arousal resulting from action did result in a well-developed pattern of visual-perceptual differentiation.

Children of different preschool age groups were asked to acquaint themselves with flat wooden figures of irregular forms in the following ways: a) looking at them only; b) touching them only; c) both looking at them and touching them; d) practically operating them in the process of inserting them into corresponding holes in a board. Sensory effects of all these different means of acquaintance were checked in control experiments in which children were asked to recognize (visually) the familiar figure from

among unknown figures. Results showed three and four year olds do better, far better, with practical manipulation of the objects. "In the process of practical operations children not only distinguished various features of the objects but also discovered some relations between them." (Zaparaphets, 1965, p. 100)

CHAPTER III
DEFINITIONS AND WORKING DEFINITIONS

A sensori-motor performance, as used in this study, refers to the ability to order and to correctly spell the child's own first name with three dimensional letters. In this study the emphasis will be placed on the fact that the pre-school child is potentially able visually to perceive discrimination of order and position of alphabet letters in his first name if given a systematic sensori-motor experience.

Alphabet letter discrimination refers to the child's ability to perceive a letter as one he sees in his own name, as being unique in and of itself in regard to position, how it is placed, and its order, to spell correctly the child's first name.

Visual-perceptual discrimination refers to the ability a child has, to perceive by sight, the position and order of letters to be placed to spell the child's first name. In this study the child must be able to discriminate that a letter he has placed is upside down, side-ways, etc., and if it needs to be changed. He also must discriminate whether it is out of the correct spelling order of his name.

Tactual manipulation refers to the child's freedom to touch and move the letters of his name until he is satisfied with his end result, as

well as to explore letters by utilization of the sense of touch.

Visual exploratory movement is the use of sight and mind, by the child, to correctly place the letters in his first name.

CHAPTER IV
METHODS AND PROCEDURES

The Department of Family and Child Development at Utah State University, Logan, Utah, provides an excellent environment for studying young children. There are three laboratories, each having a morning and afternoon program. The children are present four days a week, two and a half hours each day. Each laboratory has a supervising teacher, four student teachers, and 20 children, ten boys and ten girls, ranging from three to five years of age.

The physical setting of the laboratories consists of stationary equipment such as two open toilets, three child size sinks, and tables and chairs for the children. Selection of the rest of the equipment is a flexible matter, depending on the lesson plans of each student teacher during her week as head teacher. As practicing teachers they have access to a "large manipulative equipment closet" which includes a variety of sensory media, block steps, animal cages, large trucks, tractors, etc., for large muscle coordination; a "small manipulative equipment closet" which provides puzzles, concept development accouterments involving colors, shapes, numbers, sizes, visual discrimination, etc. Much of this is good for small muscle, eye-hand coordination. The "step-up closet" stores equipment which affords greater exploration

into roles through playhouse equipment, dolls, rubber and wooden animals, phones and many other pieces. Several other convenient storage areas challenge a teacher to develop science, art, food, and music activities as they learn to use and explore with the materials available.

A well developed portion of the equipment provided for the use of the laboratories is the library. Available to the student teachers to familiarize themselves with for the purpose of eventual utilization with the children in the lab are a great number of well selected children's books and records. The books are catalogued according to author, the records according to activity or purpose. This small room also contains a variety of selected pictures and the rhythm instruments.

In the middle of this room there is a small child size table with two small chairs. It was here in this quiet setting that the author provided sensori-motor experiences for the children in this study.

The laboratories are two-fold in purpose. Each quarter four student teachers per lab are put through a strenuous but challenging program. They are helped to become more aware of children as a group and as individuals and through this awareness to learn to perceive the interests and direction of each child's activity to enable them to lead this natural curiosity and energy into concept development as well as social growth, expansion of verbalization, and greater muscle coordination. Through such a training program one can imagine the developmental stimulation offered the children in the laboratories.

Such a curriculum not only educates student teachers but provides developmental experiences for 20 children in each laboratory.

There is constantly a long waiting list of children for admittance into the Child Development Laboratory. These children come with a variety of background in the area of family income, family education, family profession, and sometimes even a variety of languages. For example, there are children from such countries as Bolivia, Australia, India, etc. in attendance at various times.

Sample

The children used in this study were chosen at random from 120 children attending the six Utah State University Child Development Laboratory sessions during spring quarter, 1970.

Twenty-six children were chosen, putting 13 in the control group and 13 in the experimental group. As the study progressed one child had to be dropped from each group: one because she refused to accompany the author during the systematic sensori-motor experience; another because of unpaid fees, was asked to drop the lab. This gave the author 24 children, twelve in each group, six boys and six girls.

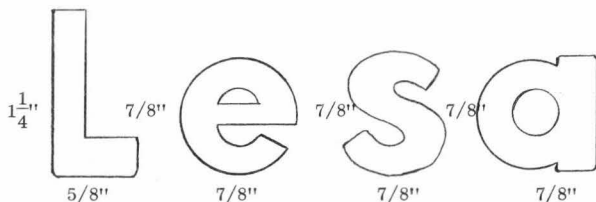
The children ranged in age between three years and six months and four years and six months. Prior experience in the lab was not a criteria for selection. Male-femaleness was not a criteria for selection, but it was

felt that it would be an interesting detail to compare at the end of the study. The experimental group was matched with the control group according to the pretest and length of the child's name.

This sample was not representative of any group other than itself. Both the experimental and the control group were receiving enriched learning experiences through the environment of the laboratories. However, only the experimental group received additional experience in letter manipulation.

Instruments

The letters used in this study were made of sturdy white cardboard with green felt mounted on the back. The style was manuscript. Upper case letters were $1\frac{1}{4}$ inches high and varied in width from $\frac{5}{8}$ inch to $\frac{7}{8}$ inch depending on the letter and its particular shape. Lower case letters were $\frac{7}{8}$ inch high and $\frac{7}{8}$ inch wide. Both were $\frac{1}{16}$ inch thick and three dimensional.



The letters of each child's first name were placed in a large legal size envelope. Upon receiving these letters and instructions the child placed them on top of a green table-size flannel board measuring 23 1/4 inches by 23 inches. The size was an advantage as it eliminated movement which a smaller board seemed to create; also, it gave a wide area for visual concentration.

The one other piece of equipment used was a card of thick cardboard on which was printed the child's name. The size of the printed letters was the same as the three dimensional letters in the envelope.

Pilot Study

The author conducted a pilot study using the pretest that was to be used in the main study, to enable her to decide how and what she would say when it came time for her to utilize this pretest to collect her data. One of the author's concerns dealt with how she was going to establish rapport with the child, and a sense of ease and confidence within the child. Another concern was to establish some form of procedure communicating instructions as to expectation, but in such a way that information pertinent to task accomplishment was not given.

Twelve children were selected randomly from three specific groups. These groups were for the purpose of determining if there was any difference in performance between different ages; also, if there was any difference between those children with prior lab experience and those without.

Those children used for the pilot study were:

Three year old children, new in the lab.

	<u>Years</u>	<u>Months</u>
Bradley	3	6
Teresa	3	0
Tracy	3	3
Jeffrey	3	7

Children with prior laboratory experience 3-6 to 4-6

Shane	4	2
Paul	4	3
Marnie	4	5
Joni	4	4

Four year old children, new in the lab.

Karl	4	7
Le Ann	4	2
Bryan	4	8
Dawni	4	4

During free play in the laboratories, when the children were engaged in a free choice of activities, the author entered the lab and after asking the Head Teacher for permission to take a child, approached the child desired asking, "Will you come play a game with me?" Sometimes the immediate

answer was "Yes," other times questions were asked as to what kind of a game. The author was patient in explaining that it was a game with letters to see if he could spell his name. It was rare for a child to refuse. If a child did refuse, generally, if asked if he would maybe be ready in a few minutes or when he was through with whatever he was doing he would say, "Yes, he would be ready then."

The piece of equipment used to establish rapport between the author and the child, and to establish a feeling of self-confidence within the child, was a large, brightly colored stacking cone. It was a toy easy to manipulate at this stage of a child's motor development and one that caught the child's interest. There were six wooden discs, each a different color: green, blue, purple, yellow, orange, and red. The children were given the cone and asked, "Can you take this apart for me?" Upon completion the author responded with "Good, let me see you put it together again." As each disc was taken off or put back on the child was asked its color and received positive reinforcement for each correct answer. If the color mentioned was wrong the author simply stated the correct color without further verbalization. No emphasis was put on whether the seriation was correct just that the discs were replaced on the cone. The author wished the experience to be a pleasant one with as little pressure involved with performance as was possible. It was felt that the cone experience was a good one and that it accomplished both its goals, of building rapport between the author and the child and self-confidence within the child.

By the completion of this task the child seemed fairly relaxed and self-assured.

Next, the pretest established for the study was given. The child was given a legal size envelope containing the letters found in the child's first name, the first letter being an upper case letter, followed by lower case letters, and was told, "(Name), take the letters out of the envelope and spell your first name. Place the letters white side up." The child usually dumped or shook out the letters and proceeded to place them as he thought his name should be spelled. There was no problem in identifying the white side. It was at this point that the author realized that some children do not realize that to spell a name or word, letters are placed in a line from left to right. Because whether a child understood that the letters while being put in order and position must also be put together in some kind of orderly line or fashion was not something being tested at this time, the author decided that a line should be provided the next time the pretest was given. A large elastic rubber band was placed around the flannel board in order to establish a line upon which the child could place the letters. This line did not interfere with his being the one to decide upon order or position of each letter.

During the pretest no more verbalization concerning the task was given. When the child seemed finished and showed curiosity elsewhere he was asked, "Are you finished?" If his answer was "Yes" his completed task

was recorded onto the data sheet along with the date and any interesting comments the child may have made. He was than thanked for coming and returned to his lab. The whole procedure ranged from four to six minutes depending on the individual child.

The results of the pilot study are as follows:

Three year old children, new in the lab

	<u>Years</u>	<u>Months</u>	
Teresa	3	0	<u>Teresa</u> ^D
Tracy	3	3	<u>Tracy</u>
Bradley	3	6	<u>Bradley</u> ^D
Jeffrey	3	7	<u>(nothing)</u>

Children with prior laboratory experience 3-6 to 4-6

	<u>Years</u>	<u>Months</u>	
Shane	4	2	<u>Shane</u> ^D
Paul	4	3	<u>Paul</u>
Marnie	4	5	<u>Marnie</u> *
Joni	4	4	<u>Joni</u>

Four year old children, new in the lab

	<u>Years</u>	<u>Months</u>	
Karl	4	7	<u>Karl</u>
Le Ann	4	2	<u>LeAnn</u>
Bryan	4	8	<u>Bryan</u>

	<u>Years</u>	<u>Months</u>	
Dawni	4	4	<u>D-w-i</u>

*Marnie refused to use the "M" as if it was not in her name.

To the author this indicated, according to the pilot study, a need for a larger study and that children of such a young age have an interest in letters but do not necessarily show a mastery of the alphabet as Gotkin (1967) has stated. However, the author did attempt, in this study, to investigate the influence of a sensori-motor experience on children's ability to discriminate letters in the alphabet.

At the end of the pilot study it was decided that prior laboratory experience did not make a difference in results of alphabet letter discrimination tasks. Age seemed to make little difference. However, three years and six months through four years and six months was the age range chosen to make final selections in the main study because there was a greater number of children in this age range from which to choose, thus making the choice a better random selection.

Main Study

Personal names were used so that each child's progress could be measured individually. The use of the first name capitalizes on the importance of the child's name and reinforces the pride felt in self-identity.

The pretest was administered to both the control and the experimental

group as an individual experience. As a result of the pilot study, done by the author, the children were familiar with the procedure of the author entering the lab during free play and asking a child if he would like to come play a game with her. At first a few were reluctant but with encouragement from the Supervising Teacher each reluctant child came slowly but willingly. After the initial experience this never seemed to be a problem. There was one child, however, who never permitted herself to be taken, as a result she eventually had to be dropped as a subject. When the children were randomly chosen three children previously used in the pilot study were selected to be in the experimental group. They were Shane, Marnie, and Dawni.

In a separate room used for the study, each child was given a legal size envelope containing the alphabet letters of his own first name. The first letter of his name was upper case while the others were lower case. He was told, "(Name), take the letters out of the envelope and spell your first name. Place the letters white side up." The child usually dumped or shook out the letters and then proceeded to place them as he thought his name should be spelled. There was no problem identifying the white side.

During the pretest, no more verbalization concerning the task was given. The whole procedure ranged from three to six minutes depending on the child.

The control group received no further stimulus other than normal lab experience, which both groups received. However, the experimental

group was seen every other day for a sensori-motor experience allowing each child to proceed at his own rate through the three tasks. Such an experience or technique was developed at the Institute for Developmental Studies at New York University.

There were three tasks or procedures which were provided for children in the experimental group. Each child set his own pace through his ability to understand and complete each task. Therefore, the number of sessions varied for each child. The first task proceeded as follows: 1) The child was given a card on which his name was printed. The letters on the card were identical to the three dimensional letters in the envelope. 2) The child was asked if he knew the name on the card. If not, together we identified it as his own name. 3) The child and the author then talked about the letters found in his name on the card. We named each letter and looked to see if there was more than one of any letter in his name. 4) The child was then given his envelope containing his three dimensional letters and directed to take the letters out. 5) The child was next told to "Place each letter on top of the same letter on the card." 6) The child was allowed to manipulate the letters until he seemed to want guidance. He was then shown the correct position and order of any letter by helping him make any necessary changes. While doing this, conversation concerning the correct order and position took place. The tone and choice of words used were of an encouraging, positive nature. For example, "You see, you almost had it --just turn it around--

there--I knew you could do it--you'll see it next time." 7) After the letters were placed on top of the correct letters on the card, the child was asked: "What does this word spell?" "Yes, that is your name, (name)." 8) The procedure was repeated unless the child refused to show interest which happened occasionally when he was not feeling well, etc.

The child and the author worked on this task for three to six minutes every other day. There are four school days in a week so that by every other day each child was worked with twice a week. He was worked with until he had mastered placing the letters on top of the corresponding letters on the card. If the child was able to complete the first task the first day, on his own, several times without mistake, he was taken to the next task.

The second task of the systematic experience was to direct the child to position the three dimensional letters directly below the printed letters on the card. This task was systematically practiced using the same procedure as on the first task, for three to six minutes every other day until accomplished.

The third task was the post-test. As the child seemed to confidently and easily position the letters correctly below the same letter on the card, the author asked the child, "Can you spell your name without the card today?" A child would say "Yes" sometimes and proceed to do it; others hesitated and said, "Maybe tomorrow." Sometimes a child was ready before being asked and would state, "I can spell my name without the card," and did it. When a

child said he was ready to spell his name without the card he was given his letters and directed to spell his name. No more was said until he was finished. Whether it was correct or not it was recorded as his third task, or post-test. After it was recorded the author and the child made the necessary corrections verbalizing as it was done. The comments from the author were always of a positive nature so the child could feel pleased at what he had done. At the conclusion of a post-test the child was told this was the last time he would have to come and was then taken back to the lab.

About the time the majority of the experimental group were being given their third task or post-test, the author began to also give the control group their post-test.

The results of each child's performance were recorded and timed.

CHAPTER V

FINDINGS

The first hypothesis stated that there would be a significant difference between the experimental population and the control population with respect to their ability to order and place in proper sequence the letters in each child's own name, after the completion of a systematic program of sensori-motor experience by the experimental group. The findings of this study support this hypothesis. Those children in the experimental group, who participated in a sensori-motor experience, made greater gains in improving their abilities than children who did not have an opportunity for the sensori-motor experience. See Table 1.

Table 1 shows the pre- and post-test scores for the experimental and control groups and indicates the differences between the two sets of scores.

The data in Table 1 indicates that the experimental group made greater gains in ordering than was true of the control group. The *t* score indicates that this difference is significant at the .05 level. In calculating the *t* score, the regression scores of those children in the control group, who scored lower on the post-test than on the pretest, were scored as 0, because this was interpreted to mean the child simply did not have the ability to order the letters properly.

Table 1. Pretest and post-test scores on ordering, positioning of letters, and improvement, by experimental and control groups

Names	Age	Group	Sex	Pretest-No. incorrectly	Posttest-No. incorrectly	Improvement	Pretest-No. incorrectly	Posttest-No. incorrectly	Improvement	Names	Age	Group	Sex	Pretest-No. incorrectly	Posttest-No. incorrectly	Improvement	Pretest-No. incorrectly	Posttest-No. incorrectly	Improvement
				ordered	ordered		positioned	positioned						ordered	ordered		positioned	positioned	
Ted	4-0	E	M	0	0	0	1	0	1	John	3-11	C	M	2	3	-1	1	0	1
Marion	4-5	E	F	0	0	0	2	0	2	Nathan	4-5	C	M	0	0	0	1	1	0
Lisa	3-6	E	F	3	0	3	1	1	0	Lesa	3-11	C	F	2	2	0	2	1	1
Stuart	3-8	E	M	5	5	0	3	0	3	Todd	3-10	C	M	4	0	4	0	0	0
Gordon	4-3	E	M	0	0	0	1	0	1	Jackie	4-1	C	F	0	0	0	1	2	-1
Jeffrey	3-7	E	M	6	1	5	3	0	3	Bradley	3-6	C	M	7	5	2	6	4	2
Melece	4-3	E	F	5	3	2	4	0	4	Meridith	4-0	C	F	5	6	-1	2	4	-2
Dawni	4-4	E	F	2	0	2	2	0	2	Jill	4-5	C	F	0	0	0	1	1	0
Jamie	3-7	E	F	4	0	4	3	0	3	Paige	3-8	C	F	4	3	1	0	2	-2
Marnie	4-5	E	F	6	2	4	0	0	0	David (A.)	4-6	C	M	4	4	0	2	5	-3
Danny	3-7	E	M	3	2	1	3	0	3	Tassha	3-9	C	F	4	0	4	3	2	1
Shane	4-2	E	M	5	0	5	3	0	3	Jack	3-11	C	M	2	3	-1	3	3	0
Total						26			25							11			5

Ordering T = 2.04 on .05
Positioning T = 2.95 or .05-.01

Of the 12 children in the experimental group only one showed no improvement in ability to order and place in proper sequence the letters found in his own first name. In the control group of 12 children, five showed no improvement; in fact, three children post-tested with a greater number of errors in ability to order and place in proper sequence the letters found in their own first name than from the pretest given.

Three children in the experimental group showed no errors either in the pretest or the post-test with respect to ability to order letters. The same is true of the control group. Three children showed no errors either in the pretest with respect to ability to order letters.

The second hypothesis stated that there would be a significant difference between the experimental population and the control population with respect to visual-perceptual discrimination, or positioning, after the completion of a systematic program of sensori-motor experiences. The findings of this study support this study. Those children in the experimental group, who participated in a sensori-motor experience, made greater gains in improving their abilities than children who did not have an opportunity for the sensori-motor experience. See Table 1.

The data in Table 1 indicates that the experimental group made greater gains in positioning than was true of the control group. The *t* score indicates that this difference is significant at the .05-.01 level.

With regard to the ability of visual-perceptual discrimination, or

positioning, of each letter of the child's own first name, the experimental group showed only one child with no improvement. The other children in this group improved with every letter right. Improvement is shown in two ways: either a child shows total improvement with a correction of every previous mistake or a partial improvement with a correction of only some of the previous mistakes in ordering or positioning of the letters found in the child's first name. Eleven children of the experimental group showed a total improvement with respects to the ability of visual-perceptual discrimination, or positioning, of each letter in the child's own first name.

The control group showed seven children, of a total of 12, with no improvement in ability to discriminate position of letters. Four of the seven children in the control group showed no improvement in ability to discriminate position of letters, in fact, post-tested scores lower than their pretest.

Only one child in the experimental group showed no errors in either pretest or post-test with respect to position of letters. Only one child in the control group showed no errors in either pretest or post-test with respect to position of letters.

It is interesting to note that no child in either the experimental group or the control group showed no errors with respects to ability to order and position letters. One or the other, but not both.

The strength of the impact of training on the experimental group of children's ability to order and position the letters in their name more correctly as a result of the sensori-motor experience is indicated in Table 2.

Table 2. Pretest and post-test ordering and positioning of letters by experimental and control group members

Name	Sex	Age	Pretest	Post-test	Times Met	Average Time
<u>Experimental group</u>						
Ted	M	4-0	<u>Tad</u>	<u>Ted</u>	3	2 min.
Marion	F	4-5	<u>marion</u>	<u>Marion</u>	4	4 min.
Lisa	F	3-6	<u>l i s a</u>	<u>L i s a</u>	6	3 min.
Stuart	M	3-8	<u>tuotz</u>	<u>Srattu</u>	4	4 min.
Gordon	M	4-3	<u>Gorpon</u>	<u>Gordon</u>	3	3 min.
Jeffrey	M	3-7	<u>ifalry</u>	<u>Jeyffre</u>	6	4 min.
Melece	F	4-3	<u>eaweh</u>	<u>Meecele</u>	4	4 min.
Dawni	F	4-4	<u>D-w-i</u>	<u>Dawni</u>	2	4 min.
Jamie	F	3-7	<u>idam</u>	<u>Jamie</u>	4	4 min.
Marnie	F	4-5	<u>rinea</u>	<u>Marine</u>	5	5 min.
Danny	M	3-7	<u>dnnn</u>	<u>Dannn</u>	6	4 min.
Shane	M	4-2	<u>hunep</u>	<u>Shane</u>	6	4 min.
<u>Control group</u>						
John	M	3-11	<u>Chan</u>	<u>h o d n</u>		
Nathan	M	4-5	<u>Nathon</u>	<u>Nathon</u>		
Lesa	F	3-11	<u>elsa</u>	<u>Lsed</u>		

Table 2. Continued

Name	Sex	Age	Pretest	Post-test	Times Met	Average Time
Todd	M	3-10	<u>ddo T</u>	<u>Todd</u>		
Jackie	F	4-1	<u>jbckie</u>	<u>jbckia</u>		
Bradley	M	3-6	<u>bradley</u>	<u>bradley</u>		
Meredith	F	4-0	<u>mitsyhr</u>	<u>bediitym</u>		
Jill	F	4-5	<u>Jill</u>	<u>Jill</u>		
Paige	F	3-8	<u>eipaa</u>	<u>aeegp</u>		
David A.	M	4-6	<u>aiv9D</u>	<u>da-na</u>		
Tassha	F	3-9	<u>pyssot</u>	<u>Tassda</u>		
Jack	M	3-11	<u>AKJ</u>	<u>AKK</u>		

This table reveals the extent to which children in the experimental group made greater improvements in their abilities to order and position the letters in their own name, than was true of the control group of children. The improvements in the experimental group were substantially greater than was true in the control group, among whom essentially no improvements were made, as might be expected.

The cohesiveness of the sample in terms of age and length of name, may account for the inconclusive nature of the findings pertaining to these factors as influences on the findings. See Table 3. However, inasmuch as the findings regarding male and female differences also suggest that these factors are not significantly influential suggests that the most potent influence on the child's development of a capacity to order and position the letters of his name seems to be experience and training. Nevertheless, the size of the sample makes it unwise to rule out influence from age, sex, or length of the child's name, particularly as might be found in a sample which might be selected to include a greater variation in the number of letters in the children's names, and in the age of children included in the study.

Table 3. The number of times each child participated in training sessions, by age, length of name, and sex

Times Met	Boys		Times Met	Girls	
	Length of Name	Age		Length of Name	Age
2			2	5	4.4
3	3	4.0	3		
	6	4.3			
4	6	3.8	4	6	4.5
				6	4.3
				5	3.7
			5	6	4.5
6	5	4.2	6	4	3.6
	7	3.7			
	5	3.7			

CHAPTER VI
DISCUSSION OF FINDINGS

There seems to be disagreement among researchers as to the ability of the three and four year old child to transfer haptic perception of shapes and forms to visual perception. This seems to indicate a disagreement among research findings as to the value of haptic exploration corresponding with visual exploration when providing visual training, pertaining to shapes and forms, for the young pre-school child.

Abravenel (1968) suggests that spatial positions are not readily transferred from haptic to vision by three and four year old children. And yet Birch and Lofford (1963) postulate evidence of greater proficiency of children when using haptic and visual perceptions to discriminate shapes and forms. Walk and Gibson (1961) also concluded that visual experience was relatively ineffective without somesthetic arousal resulting from action.

Vernon (1957) states that children under five, unless of high intelligence, are not capable of discriminating shapes with sufficient accuracy to enable them to perceive the shapes of letters and words. However, Zaparaphets (1965) suggests that children, if given practical operational experiences with shapes and forms, do very well in distinguishing various features of the objects; they also discover some relations to them.

Although findings of other researchers are not consistent, there seems to be strength to postulate the importance of three dimensional letters to allow haptic exploration of both order and position. The findings of this study are important in that they do suggest how tactual manipulation and visual discrimination teamed together, do seem to be interrelated and interdependent in showing the positive effects of a sensori-motor experience.

Vernon (1957) states that young children are indifferent to the order of letters. In contrast to this view, the author feels that the findings show a great awareness of letter order on the part of three and four year olds as indicated by the tendency for the post-tests to show a great improvement in the ordering of the letters. However, if Vernon is referring to the retention of abilities to order letters, this study may not be in disagreement, because no effort was made to study retention abilities. Another study would be well worth projecting along these lines.

The author feels that the findings give a strong indication of the importance of providing consistent sensori-motor experiences dealing with alphabet letters. From this study the author found that many children are not well on their way to mastery of the alphabet before entering kindergarten as Gotkin (1967) has stated. Although this sample of 24 children is small, it seems strongly to suggest that children need more sensori-motor experiences with letters. Only two of the 24 children showed an understanding of correct positioning of letters prior to their sensori-motor experience. No

child demonstrated both the ability to order and position letters prior to the experience.

The author feels that this study indicates an interest, as well as an ability, on the part of the child to explore and understand letters. A child at three and a half or four years of age is not too young, as many educators feel, to begin learning alphabet discrimination. Children are motivated to explore discrimination tasks involving the letters in their own names, so there seems to be no reason to limit their discrimination experiences to shapes which have no personal appeal to them any more than to limit their discrimination experiences to letters alone. This study strongly supports the opinion of the author and many educators, that the young child can very readily handle the discrimination and understanding of both upper case letters and lower case letters during the initial stages of letter familiarization. Nine of the 24 children showed awareness that their name began with the large letter or upper case letter by placing it at the beginning of their name on their pretest. Only four of the nine were experimental children. Nineteen of the 24 placed the upper case letter first in their name on their post-test. Twelve of the 19 were experimental group children, being the total experimental group. One child in the experimental group said, the first time she met for her sensori-motor experience, that "these two letters are not in my name." Her name was Dawni. She could place D w i but insisted that the other two letters were not there for her to use. She described the letters she needed

as being "A" and "N" by using her finger to trace them on the board. It was then the author realized she had seen her name in all capitals, never with lower case letters. After working with her, she had no problem identifying the lower case letters as hers in her name and ordered and positioned them correctly. The transition was very confusing and upsetting to her at first.

The one child in the experimental group who showed no improvement in ability to order letters did show improvement in ability to position. This child always preferred placing the letters on top of the corresponding letter on the card. He consistently asked or stated his desire to place them on the card. When it came time to place them below, he either first had to place them on top, which he was permitted to do, or he just flatly refused to place them below. He just did not seem to feel comfortable placing letters to spell his name without the total support of the card. However, when asked if he could spell his name without the card, he responded "Yes."

The child, in the experimental group, who showed no improvement with respect to ability to position letters, improved greatly in the area of ordering. This child's attention span was the shortest of the 12 in the experimental group. It is interesting to note that she is the youngest of the group, three years and six months. Her tactual manipulation of letters showed her to use the palm or entire five fingers of her right hand. This observable condition and her young age may account for her lack of improvement in the area of positioning letters. At least she was consistent in her error.

Both her pretest and her post-test showed her "a" to be placed sideways. Abravenel (1968) made the same observation of the use of palmer manipulation in his study of haptic and visual sense modalities, finding that the younger the child the greater the possibilities of this palming kind of haptic exploration as opposed to finger-tips.

While every child but one improved in their ability to order, in the experimental group, not every child showed a total improvement as they did in their ability to position. This may indicate that maybe position is easier to discriminate than order at this stage of the child's development.

Sex and age showed no dominance within the experimental group as to improvement of ability to order or position letters.

Range of improvement ran from one letter to the total amount of letters found in a child's name. For example, Danny incorrectly ordered three letters found in his name during his pretest, pnncl. His post-test showed two letters incorrectly ordered, Danyn. His score of improvement then equaled one. However, Shane incorrectly ordered all five of the letters found in his name during his pretest. His post-test showed no errors. His score of improvement then was five.

The recording of the length of time for each sensori-motor experience for each individual child and the number of times the author met with each child is another observable factor for interest sake only. It just reminds one that each child learns at his own rate and that one experience is generally not enough for a child to obtain correct concepts.

Each child of both groups was given a colored stacking cone to manipulate prior to his pretest for the purpose of establishing rapport and self-confidence within the child. Six colors were involved: green, blue, purple, yellow, orange, and red. Although seriation of the stacking discs and identification of the color of each disc were not part of the study, both were an interesting side line. As a result, the following comments were observations, by the author, of the awareness of a few children of both groups as to seriation and color.

- Ted - knew all six colors
seriation--perfect
- Marion - knew all six colors
seriation--perfect
- Lisa - knew all six colors
no seriation
- Dawni - called orange red; purple blue. However knew both red
and blue. Seriation--perfect
- Jamie - knew all but purple
seriation not recorded
- Marnie - knew only orange, yellow, red, and blue
no seriation (May have been teasing author)
- Danny - knew all but purple
no seriation
- Shane - colors not recorded
no seriation
counted each disc as he took apart, also counted the
letters in his name
- Nathan - knew colors
seriation--perfect

Lesia	-	knew colors seriation--perfect
Todd	-	colors not recorded no seriation
Bradley	-	knew colors no seriation
Jill	-	knew colors seriation not recorded
Paige	-	no verballity no seriation
Tassha	-	knew all but purple seriation not recorded

It is interesting to note how well the children, who show no seriation, do with ordering and positioning of letters. For example, Shane, in the experimental group, shows total improvement in his post-test over his pretest and yet shows no awareness of seriation. Todd, in the control group, shows the same results. All this is merely observation with no attempt to attain significant variance of any kind.

CHAPTER VII
SUMMARY AND CONCLUSIONS

The purpose of this study was to determine if an experimental group of children would make significant improvements in their ability to discriminate and order alphabet letters after a systematic reinforcement program of sensori-motor experiences with letters.

The study involved tactual manipulation in learning the discrimination of, the order of, and the position of the alphabet letters in the child's own first name.

Two hypotheses were made:

1. There will be a significant difference between experimental population and the control population with respect to the ability to order and place in proper sequence the letters in each child's own name, after the completion of a systematic program of sensori-motor experience.

2. There will be a significant difference between the experimental population and the control population with respect to visual-perceptual discrimination, or positioning, after the completion of a systematic program of sensori-motor experiences.

Twenty-four children, 12 in an experimental group, 12 in a control group, six boys and six girls, between the ages of three years and six months

and four years and six months were selected at random from the Utah State University Laboratories. Preceding the actual collection of data a pilot study was conducted on a similar group of 12 children using the proposed pretest.

During free-play in the Laboratory, each child was asked to go with the author to play a game. The first time with the author, and prior to the pretest, the child was given a brightly colored stacking cone to manipulate for the purpose of establishing rapport and self-confidence within the child. Each child in the experimental and control groups was given a pretest to test his ability to discriminate and order letters found in their own first name. The experimental group received a systematic sensori-motor experience twice a week dealing with letter discrimination. The control group received no experience in letter manipulation after the pretest. Each child set his own pace and was given the post-test only when he stated he was ready. At the time the majority of the experimental group was receiving their post-tests the control group received theirs.

The findings support both hypotheses with the difference of the experimental group and the control group showing significance at the .05 level for hypothesis one and between .05 and .01 level for hypothesis two.

Conclusions

1. Children who are at the sensori-motor level of development learn new tasks more readily when the learning experience provides multiple

reinforcement opportunities through utilization of more than one of their senses.

2. Sensori-motor experiences in a teaching-learning situation provide growth opportunities in the development of perception abilities.

Recommendations for Future Studies

1. A replication of this study carried further to test for retention of order and position of letters learned over a period of time.

2. A replication of this study adding the third dimension of letter identification by name, as well as ordering the letter and positioning the letter in the child's name.

3. A replication of this study using both first name and last name or any other word.

4. A replication of this study using letters of one color on both sides.

5. A comparison of this study and results of a similar one done with kindergarten aged children to see if sensori-motor development with age is indeed an influential factor as to when to start children working with letters.

6. A replication of this study using shapes and forms in place of letters to see if this makes any difference in results.

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