Visual Perception in Pre-School Children

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VISUAL PERCEPTION IN PRE-SCHOOL CHILDREN

by

Candace Savage

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

MASTER OF SCIENCE

in

Family and Child Development
ACKNOWLEDGMENTS

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Candace Savage
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ABSTRACT

Visual Perception in Pre-School Children

by

Candace Savage, Master of Science

Utah State University, 1971

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

The efforts of practice sessions in discrimination tasks with the aid of instructional cues were studied to determine their influence on the visual perceptual abilities of pre-school children. The research was conducted at the Utah State University Child Development Laboratories with twenty children. Ten of these children were three years of age and ten were four years of age at the time of the study. Of the twenty children, five boys and five girls, were given training in performing tasks requiring ability in visual perception. The remaining ten children, five boys and five girls, were not given any visual perceptual training.

It was found that the ten children who had received individualized instruction during the practice sessions scored significantly higher on the visual discrimination tasks than the ten children who had received no training. The children made significant improvement through the practice sessions which was indicated by a comparison of the beginning test scores to the ending test scores.
There was a significant difference in the visual perceptual abilities of girls and boys and older and younger children as measured in the visual discrimination tasks.
INTRODUCTION

Perception is basic to all learning. There is nothing a child can learn which does not involve at least one of these elements of perception: recognition, awareness, interpretation, or understanding.

Because all children are expected to go to school, they cannot avoid coming into contact with different tasks demanding visual perception abilities. One such task children must master is that of reading in which visual perception abilities are essential as Byran (1964), Gates (1926), and Harris (1962) have indicated. Learning to read is one of the most difficult and complicated tasks facing a young child. However, if a child has developed his visual perception skills before he attempts reading he will be more likely to find success.

It is unrealistic to assume that all children of the same chronological age will have developed the necessary visual perceptual skills necessary for learning upon entrance into school. Furthermore, all children will not be at the same developmental level in their visual perception. Curti (1923), Clark (1968), and Alexander (1969) have pointed out that a child's chronological and mental ages are not true indications of the stage of physiological development he has reached, for each child has his own individual growth pattern. Therefore, if a child receives practice and experience in different visual perceptual activities he will be more likely to find success not only in reading but also in other related areas of learning. This success may well be a motivation for extended reading and increased interest and ability.
The author acknowledged the existence of a great deal of research establishing the importance of visual perception. However, it was believed that further research is needed to determine if a child's visual perception could be increased through individualized instruction, practice, and experience. Knowledge of this type would be valuable in helping children find success in reading and in their total learning in school simply by attacking and eliminating perceptual problems that some children may have.

It was with continued investigation and increased knowledge of the importance of visual perception that the author became interested in undertaking the present study on development of visual perception of pre-school children.

It is the purpose of this study to determine if a child's visual perception abilities can be increased through practice with fruit and animal picture puzzles. Through discrimination of puzzle form parts that make a whole, the child should be able to transfer this knowledge in learning that different parts combine to make a whole letter or a whole word. It may also present an incentive for further learning of black and white symbols--letters and words--that the child will find in his reading book which will help to increase his reading skills.

**Statement of the Problem**

A child's visual perception abilities are extremely essential to his success in beginning reading, and they play a significant role in determining his success in reading and his entire school achievement. In view of this knowledge, the author desired to investigate the development of children's perception
and observe whether a child's visual perception abilities can be developed and facilitated through training by practice in perceptual motor activities utilizing fruit and animal picture puzzles produced by Teaching Resources Division, Teaching Systems and Resources Corporation, Boston, Massachusetts.

**Objectives**

1. To observe any significant differences between the visual perception abilities of children who have had practice in visual perceptual activities through the use of the fruit and animal puzzles and the visual perception abilities of children lacking such experience.
2. To observe any significant differences between visual perception abilities of older and younger children.
3. To observe any significant differences between perception ability of girls and boys.

**Hypotheses**

1. Experience in visual discrimination tasks will have no effect in promoting perceptual abilities in children.
2. There will be no significant difference between girls and boys in the control and experimental groups in their visual perception development as measured in the visual discrimination tasks.
3. There will be no significant difference in perceptual abilities of older and younger children.
Visual Perception, Reading Readiness, 

Beginning Reading

Visual Perception

"Perception is intake. To perceive means to recognize, to acknowledge, to interpret, to be aware of, to identify with, to associate." (Smith, 1969, p. 57) Goins (1958) defines visual perception as a process through which information is apprehended by the mind through the sense of the eye. This occurrence involves these distinct processes: perceiving the symbols from the page and the transmission of the impulses to the brain for interpretation by the mind. Renshaw (1945) pointed out a common agreement that the process of perception precedes from general to the specifics, that is seeing the whole, complete picture, then identifying the minor details. Gestalt psychologists uphold the views of Renshaw but carry the definition of visual perception one step further in saying that organization of the various parts into a whole has to take place. Strang (1955) maintains that there has to be mental activity taking place, or understanding of the whole. Kellogg tends to be in agreement when he makes this statement: "Perceptual organization is something that originates as a physiologic characteristic of the nervous system." (Kellogg, 1969, p. 11) Vernon (1937) presents a more extensive, broad definition of the perceiving process. He maintains stage one as knowledge of something existing.
in the visual field, stage two as awareness of the visual stimulus being connected with some object in the field, and stage three as understanding meaning of the form or object. Betts (1968) places emphasis on discrimination or detecting differences and similarities in forms in his definition of perception. He maintains that a child doesn't have to know the name of the symbol as long as he can distinguish its characteristics. One example is seeing the word cat, distinguishing its characteristics into speech sounds, and combining these sounds with what they represent, a "cat." A rather conclusive statement by Robinson ties the many facets of visual perception ability together when she says: "Visual perception probably involves many of the higher mental processes and consequently may be associated with intelligence, previous experience, language facility, and bodily well-being." (Robinson, 1946, p. 223) Heilman has called attention to the importance of visual perception in his statement:

Although the process of perception is apparently a simple mental process, it is basic to all learning. It mediates the meaning of all incoming sensory data in terms of the individual's past experiences, thus assuring that the new meanings he acquires will be integrated into the whole of his store of knowledge, his cognitive structure (or Piaget's 'schemata'). The more abundant the child's sensory experiences and past associations, the richer his perceptions and the greater his learning will be . . . . (Heilman, 1967, p.165)

There seems to be a general agreement that visual perception ability is an acquired ability. Zaporozhets (1965) maintains that perception follows a very complicated pattern of development during the first years of life; it does not arrive suddenly in complete form, but it increases gradually through experience in the environment. Frostig, Lefever, and Whittlesey (1961)
indicate that the development of perceptual skills is a child's main development task between ages three and eight years until judgment and intellectual development take the lead. Heilman agrees with Gestalt psychologists that the perceptual process develops differently in different individuals, but he also contends that it can be facilitated through practice and experience. "Maturation cannot be hastened, but visual discrimination can be sharpened through experience and practice. The school must provide much of this experience as is needed, and different children will need different amounts . . . ." (Heilman, 1967, p. 46)

Heilman (1967) maintains that this mental process of visual perception is necessary if the child is to become involved in the process of recognizing and interpreting sensory experience presently taking place in terms of his past experience, and to make certain that the new meanings acquired will be woven into his present store of knowledge and cognitive structure. Smith tends to agree with Heilman in his summation: "If there is no perception, there is no basis for anything more than memorization or recall. So it is important to take the time to orient children, to give them opportunities to 'feel their way' into what they learn." (Smith, 1967, p. 64) He continues by saying that even though visual perception is only one facet of perception, it is a most important one. Harris explains visual perception as a complex process which may be responsible for various learning difficulties: "Even if the eyes are normal the child may have immature visual perception. Seeing a thing doesn't always mean noticing its details." (Harris, 1949, p. 29) Many young children pay attention only to the main characteristics of visual stimuli: the size, shape,
and color— and ignore the details. When asked to match letters or words they make many errors, not because of faulty vision, but because they do not perceive visual differences which are obvious to older children.

Shumard (1968) pointed out that psychological research indicates that many learning problems, especially in reading, stem from visual perceptual difficulties. Some of the most common difficulties are: "visual motor coordination, figure ground perception, perceptual constancy, the ability to perceive position in space, and the ability to perceive spatial relationships." (Shumard, 1968, p. 23) He continues to say that a child must learn to coordinate his vision with movement of his body in order for learning to take place. If a child is unable to focus on a certain object or moves from object to object in his field of vision, he is deficient in figure ground perception. Another visual perceptual problem hampering a child is the difficulty he may have in recognizing an object as it changes color, size, or is viewed from a different angle. A child's failure to recognize spatial relationships, giving attention to several objects as they relate to one another and to himself, is another perceptual problem. A child lacking ability in these skills will have great difficulty not only in reading but in all related learning areas. However, these perceptual problems are not unique for only one or two children in the school—some school officials estimate that deficiencies in visual perception may be found in as much as 25 per cent of the school children.

Observations made by Frostig (1964) at her clinical school revealed that the greatest contributor to learning difficulties was disturbances in visual perception. Poor hand-eye coordination was exhibited by children having
difficulties in writing. Those children handicapped with poor figure ground perception were unable to recognize words. If a child failed to recognize a letter or word written in a different size or color, he usually had poor form constancy. Difficulties in space relationships were expressed in children's writing reversed or rotated letters in words. Frostig also observed during the study that the children with evident visual perceptual problems had difficulty in paying attention and exhibited various behavioral problems. Studies of Wipple and Kodman (1969), Coleman (1960), Walters and Doan (1962) have evidenced that a child's inefficient visual perception or other perceptual handicaps may lead to his retardedness in over-all learning. Coleman further states that this perceptual retardation is cumulative through the years. Frostig, LeFever, and Whittesey (1961) cite extensive clinical case studies showing that children with severe perceptual disturbances are often unable to overcome their perceptual handicaps to resume normal progress and satisfactory achievement in their school work.

On the question of whether or not there exists a general visual perception ability in individuals, Goins quotes Arthur I. Gates, "... there does not appear to be any such thing as 'general visual perception'. Rather there are abilities to perceive words, digits, geometrical figures, etc; each of which is relatively independent of other perceptual abilities." (Goins, 1958, p. 7) He continues by saying that Gates found no single cases of reading disability associated with generally inferior perception. The later investigation of Gates confirmed his earlier study:
What we call visual perception is not a single, unitary capacity or power which operates uniformly upon all sorts of data and under all conditions: perception, on the contrary, is specialized. Each person perceives some things better than others. A person who perceives poorly non-verbal items will not necessarily perceive words poorly; nor will the person who perceives poorly in reading surely perceive similarly other data. Perception, as it functions with words as data, then is rather a special kind of perception and in the majority of cases it cannot be predicted at all accurately from knowledge of other types of perception. (Gates, 1926, p. 436)

Stroud has contrasting views to those of Gates. He presents the possibility of a general factor of visual perception when he makes this statement:

> It would hardly seem true that the abilities involved in perceiving words, letters, and digits are separate abilities—if there is a common mental set and a common mental reaction to be made. If "ability" be interpreted strictly to mean performance, without any connotation of capacity perception of geometric designs may be regarded as a separate ability, in the sense that it does not correlate with other abilities. However, the low correlations between perception of designs and perception of words, letters, and digits may be due to differential practice, not to differences in innate capacities involved. (Stroud, 1945, p. 495)

There exists a concern whether visual perception abilities can be developed or facilitated through training. Increased and widespread interest in this area was set forth by Renshaw (1945) and his colleagues when he introduced tachistoscopic training of individuals in rapid recognition of visual forms. The results of one hundred-six training and testing periods clearly evidenced that children who had received training in the tachistoscopic method read more fluently and understandingly than children who had not received this training but who had equal ability. Goins (1958) was inspired by Renshaw's experiment, but was in disagreement with his findings when the evidence of his study indicated that training in visual perception by the tachistoscopic method produced no gain in learning to read. Frostig (1964) was also concerned with
training for visual perception development. She maintained through her research that there were five perceptual abilities important in the visual perceptual process whereby training in the area of difficulty would enable the child to overcome his perceptual problem before the difficulties were multiplied causing added problems. She maintained that these five perceptual abilities were not the total processes taking place in visual perception but they were important parts which developed independently of one another with a definite relationship between them and the child's ability to learn. In view of this evidence, she designed a number of tests to determine the area of difficulty and to instigate the necessary training. Results indicated that specific training based on the test outcome lead to observable changes in the child's perceptual ability. Further investigation undertaken by Silverstein (1965) tend to support Frostig's premise of the value of directing perceptual training toward the distinct area of perception not operating correctly. Olson (1966) has contrasting views with those of Silverstein and Frostig. Through results of his research, he maintains that there is no relationship between Frostig's test of visual perception and specific reading difficulties.

Readiness for reading

"There is no such thing as 'reading readiness', there is only child readiness--more precisely, individual child readiness. (DeHart, 1968, p. 207) Krippner also agrees that readiness is the key to all learning as he emphasizes in this statement: "Readiness is an essential factor in any phase of learning. If an individual is to learn, some foundation for that learning must
be established. For example, reading ability does not suddenly appear; it is based on a number of factors associated with readiness." (Krippner, 1966, p. 12)

Barrett (1962) indicates that from the very beginning there has been a concern as to what factors were involved in reading readiness and reading achievement. King (1969) believes as do other authors that readiness for reading comes when a child matures. Karlin (1957) agrees but further states that a child's readiness cannot be measured by gross physical development. Townsend (1962) points out that research has not effectively challenged the "six year generalization" which states in essence that a child who is six years old chronologically and mentally should be ready for the skills required in beginning reading. Hampleman (1959) found that children chronologically older upon entrance in school were not handicapped in learning, but in some cases they made better progress than the younger children. This generalization which is implying "maturity" is also stressed by many other students of reading. Townsend (1962) continues by relating results of a Canadian study which indicated mental age a more significant determinant of readiness. However, he contends that both physical and intellectual maturity will be the determining factors as to whether or not the child will succeed in his first reading attempts. According to Thackray (1964), research indicates that the important factors in reading readiness are skills such as: visual discrimination, auditory discrimination, mental ability, home environment, and emotional and personal attitudes. He conducted experimental studies showing the correlation of these skills with reading achievement. He found that auditory and visual discrimination
correlated the highest with reading achievement. General ability and home environment were found to be important, while personal attitudes and emotional feelings were relatively unimportant.

That accurate perception is more important when child begins to read is generally agreed upon by the investigators. Betts as early as 1943 and Harris more recently in 1961 noticed that in every reading readiness test there was a part requiring some type of visual discrimination. Betts (1968), Bernetta (1962), Gotes (1926), Muehl (1961), Wheelock (1967), and Shea (1968) support the theory that ability to visually discriminate or ability in detecting likeness and difference in letters, words, and objects is a prerequisite in learning to read. Bryan (1964) DeHirsch (1957) and Barrett (1965) carry this aspect one step further in saying that those children unable to visually discriminate will be more likely to experience retardness in reading. Coleman (1953) verifies these findings in his studies which revealed that retardation in perceptual abilities lead the child to reading disability. Of the thirty-three children he tested having reading disabilities, twenty-seven of them were perceptually retarded. He also found that children with reading disabilities were retarded in performance of various perceptual tasks in contrast to children showing no such disability. Recent research of Wipple and Kodman (1969) compared normal readers with retarded readers, both groups having the same I.Q. Results were that the perceptual learning abilities of the retarded readers were significantly inferior.

Results of a study conducted by Bryan (1964) and later verified through studies of Rudnick (1967) indicated that visual perception abilities correlate
more highly with reading readiness than does intelligence on the kindergarten level. On the first grade level, visual perception scores had greater predictive value in reading success than did intelligence and readiness. For second graders visual perception had the highest correlation with reading comprehension. Intelligence was a better predictor of reading success in third and fourth grades. This investigation shows that visual perception is important in learning to read, but it contributes less as reading ability develops at which time intelligence and reasoning take on greater significance.

King (1969) believes that reading should not begin before children are ready. She contends that the ability to see close objects starts developing in infancy, and by the time the child is five or six years old he has developed a degree of hand-eye coordination along with ability to focus both eyes on a close object. Hoppock (1966) carries the discussion further by pointing out a statement made by Dr. Kenneth Zike, Head of the Department of Pediatrics, in which he says that the eyes of children in kindergarten may be able to receive the visual images, but as high as 75 per cent of their neurological systems have not reached the maturity to make connections between what they see and what they understand. Nothing can be done to speed up this process, it just takes time. Gesell, Ing and Bullis (1949), Milner (1967) and Breckenridge and Murphy (1964) support Hoppock's generalization in their agreement that the eyes of a child up to age six are still changing physically and are developing uniquely in each child. Heilman (1961) De Boer and Dallman (1960) agree that if an attempt is made to teach a child to read before he is visually able to learn many serious problems may occur and the child will be more likely
to fail. It is important for the child to have reached visual maturity because during the pre-reading period greater demands are made on the child to discriminate sizes, shapes, details, and spatial relationships.

Even though educators agree that reading instruction should not begin before the children are ready, there is not a general agreement on the particular method to use in fostering readiness.

A few believe that readiness for reading is an individual matter which will result from maturation. Many more now believe that the pre-reading program should be planned to teach specific skills. The evidence is accumulating that readiness for reading can be promoted by the implementation of a good pre-reading program. Through research, a beginning has been made in identifying certain skills that will facilitate learning to read, and others which are of little value. (King, 1969, p. 552)

These readiness skills required for reading don't just come naturally, states Connell (1968), but they are learned skills. Researchers have substantiated the value of a pre-reading program and are now concerned with the question of what should be included in such a program. King (1969) makes reference to an ideal reading program as one which includes literature, language, and visual and auditory training. Pictures, stories, and language experience are the main materials which will greatly contribute to comprehension and later reading ability, for the thinking processes required in the activities are much the same. Lachman (1960), Fabian (1945), and Silver (1952) emphasize the importance of perceptual motor maturity in developing reading ability. Because the areas of the brain controlling motor function are the first to develop, Connell (1968) and Hunt (1961) maintain that the motor skills of learning to write the letters of the alphabet would be the easiest skill to teach first.
Young children love to copy shapes, letters, words, and it can be a satisfying, successful experience for them. Secondly, a child could learn to distinguish letters by sight. Thirdly, to learn the order of symbols by ear. The last and most difficult process involves speech and vision to associate the visual symbol with its specific name. Wilt (1968) indicates that understanding and use of oral language is a prerequisite in a child's learning to read and understand printed symbols. These language abilities can be developed by encouraging a child to express his own ideas in words, and to listen and understand the language of others.

Scott (1968) points out the views of Piaget and Inhelder in which they agree that early enrichment programs should include seriation (perception--ordering by size) and classification (language--categorizing). Connell reviews the difficulty of the task facing children when she states:

Learning to verbalize and discriminate between 44 separate sounds of the English Language and learning to make 26 abstract visual symbols according to a set pattern then learning the specific names for these visual symbols is a difficult task. Some children are bound to fail. (Connell, 1968, p. 54)

However, King (1969) maintains that this failure can be prevented through a preparation to help the child find success in early reading attempts and eliminate potential reading problems which may cause failure.

A five year study begun by Hillerich (1966) shows comparisons of a group of 363 first grade children who had the readiness program in kindergarten with a group of 449 of those not having the program. The results showed the experimental group benefiting from the readiness training by advancing higher in reading at the end of the year. Brezeinski (1967) also cites evidence
from more recent research, the Denver Study, in which it was discovered that pre-reading skills developed in Kindergarten resulted in greater reading skills of children by the end of the first grade. Connell (1968) contends that if a teacher spreads the basic learning skills over the previous year when the child is ready to learn there might be a better chance for success in reading. In such a case the pre-reading program gradually becomes the beginning reading program. King mentions that "a child whose language isn't developed who is weak in auditory and visual perception or has similar problems, will benefit greatly from special activities which will prepare him for the regular reading experience." (King, 1969, p. 552) However, she doesn't maintain that a pre-reading program will solve all the problems in reading: but she sees it as a good beginning to provide the child with successes to make learning to read more rewarding and enjoyable.

**Beginning reading**

According to Shumard (1968) reading is one of the most complicated tasks a child will encounter in his lifetime. Oliver (1967) and Vernon (1958) point out that to a child words are only jumbles of black lines on the white page with no pattern or set form. The letters are not clear and obvious; therefore, it is extremely easy for children to confuse words the same length unless they note something unique about them (double letters ee, tail on y). However, each child is expected to learn which spoken words are represented by each group of little black marks in order to read. Another problem facing a child is distinguishing between shapes alike in form but facing in...
different directions (left and right sequence; reversed and rotated letters). To learn that a letter means one thing when facing a certain direction and another thing when facing a different direction is difficult for any child to understand and remember. Some consider learning to talk as a very complicated process—but it can be learned through imitation whereas reading cannot. In fact reading is the first complex task a child must learn through his own efforts. Heilman (1967) believes that unless a child is able to differentiate between letter forms and words on the page, it will be impossible for him to read the words and derive meaning from them. Shumard (1968) and Oliver (1967) continue to say that success in reading is necessary to motivate further success which will eventually produce a skilled reader.

King stated that there are two extremes which should be guarded against in the teaching of reading. "One is an excessive pressure to learn to read disregarding the child's maturation and level of development. The other is not seizing the right moment when the child is motivated, interested, and ready to learn." (King, 1969, p. 550) De Hart (1968) relates that a child is unable to act on the information before him until he is able to see, to perceive, and to really understand what his eyes have seen. Hymes lends his support to the child's individual maturational level of development. "Each child must set his own pace. The age to read blossoms in different children at different times... forcing all children to begin at the same time hurts too many youngsters and spoils reading for too many." (Hymes, 1968, p. 38)

Strang, McCullough and Traxler (1964) seem to agree with Hymes when they indicate that a child can be stimulated for a short time to exceed
his normal development rate, but this accelerated growth is only temporary. The child will soon resume his original growth pattern and grow in his own natural pace, regardless of any premature training. The other extreme, not seizing the "right" moment when a child is motivated and interested in learning, can be just as disastrous as teaching reading too early. King (1969) maintains that the "right" moment is when a child shows interest and responds to events taking place around him, and when he is anxious to hear and use languages to label objects he sees and plays with. At this time the child is generally ready for beginning reading--keeping in mind that every child is an individual and must be treated as such. Zigler (1970) sees a middle course between the two extremes as the most successful approach.

De Hart maintains that there are a number of skills which are required in reading. She defines the following as a nutshell of the necessary skills:

1. Gross motor control to maintain the correct posture necessary to sit at a desk and hold a book in the proper position.
2. Fine muscle control to open a book and turn the pages.
3. Eye-hand coordination sufficiently advanced to insure ability to focus visually upon a figure in space--first the book, then the specific word to be read.
4. Ability to perceive a figure in space (figure ground perception).
5. Directionality--ability to perceive and orient oneself to the top, bottom, sides, front, and back of the object.
6. Ability to organize a temporal spatial relationship, moving the eyes sequentially from one word to the next, left to right, top to bottom and page to page.
7. Ability to differentiate characteristics of letters that make up words, small and capital letters, and words and pictures.
8. Ability to classify or recognize common characteristics of words, pictures, numbers, letters, etc.
9. Ability to understand concepts presented in the text.
10. Ability to enter into a sufficiently positive interpersonal relationship with a teacher to be motivated to learn to read.
11. Well developed auditory discrimination including especially the ability to focus hearing upon and repeat phonetic sounds in words, in order to associate these sounds with their visual counterparts in reading.

12. General ability to focus attention upon the task at hand, involving any of all the various skills involved in reading. (De Hart, 1968, p. 204)

The value of perceptual activity as playing a significant role in successful reading was demonstrated in studies of Elkind, Larsen, and Van Doorninck (1965) and a later study of Elkind and Deblinger (1967). Halgren (1961) related an experiment which established the positive effects of training in visual perceptual methods compared with a similar class trained by standard remedial reading methods. The visual perception class were trained in activities requiring visual perception skills such as eye movement patterns and activities requiring quick accurate changing of eye focus. The children gradually moved to higher levels of training. The results were significant in all areas of the reading tests following the training. The remedial group measured an increase of .08 years while the visual perceptual group measured an increase of 1.1 years. Other visual perceptual skills required in the interpretation of pictures have proven valuable in teaching reading as Monroe (1951), King and Muehl (1965) found in their studies. They found that similar words were learned faster when accompanied by a picture or by having the child say the word when early reading attempts were made.

Harris (1962) reviews two conflicting views in the teaching of reading: One view held by Witty (1961) and others, represents a meaning first approach which is better explained as a cognitive process of thought patterns. The main stress in this approach is on the meaning of words, sentences, and stories
while emphasis on alphabet symbols comes later. In the second view held by Bloomfield (1942) and Diack (1960) beginning reading is seen as a perceptual ability in which a child makes the necessary discrimination before interpretation of the written symbols into spoken words can occur. Even though the meaning first approach has been most popular in America, the discrimination first approach is reappearing especially since a number of books: Why Johnny Can't Read by Flesch, Bloomfield and Barnhart's Let's Read, and Chall's The Great Debate were published.

In the analysis of Chall's (1969) research, she indicates the first step in learning to read is mastery of the alphabetic code. According to her findings this approach produced better word recognition and spelling which made beginning reading easier for most children. Her claims are supported by Anderson and Dearborn (1952).

Harris (1962) explains that both methods, meaning and discrimination, will succeed in teaching children to read but only the emphasis is different.

In the meaning emphasis approach the written word serves as a sign of an idea of which the child has experienced or is familiar with. In the discrimination approach the emphasis isn't on the language and meaning so much as it is distinguishing between the written symbols and their individual sounds in speech. Discrimination is a step to unlock the sound of a word and after identifying the sound, determining its meaning if they are familiar with it. (Harris, 1962, p. 6)

Harris continues to say that a balance between discrimination and meaning will produce better results in beginning reading. He maintains that there are two conditions necessary for an effective reading program: First the demands of meaning and discrimination must be met in a way which the child
best understand and utilize the information. Second, it must be presented to children on their developmental level fulfilling their needs. "It is in this way that the child engages in reading as a meaningful, thinking activity, and develops a more favorable attitude toward reading which is so important." (Harris, 1962, p. 8)
METHODS AND PROCEDURES

Setting

The three Child Development Laboratories which are operated by the Department of Family and Child Development are located in a large complex called the Family Life Building at Utah State University. The purpose of the Laboratories is to foster the intellectual, emotional, social, and physical growth as well as the development of each individual child enrolled in the laboratory. It is the desire of the teachers and staff to fill the hours spent in the laboratories with enjoyable learning activities which stimulate further growth and development. First hand experiences are emphasized as having the greatest learning potential for a child.

Two groups of children meet in each laboratory Monday through Thursday of each week for 2 1/2 hours. The teachers stay an additional hour for setting up equipment, clean up responsibilities, and discussion of the day's activities. Friday is utilized by the teachers to plan for the coming week's activities and to make any necessary preparations such as rearranging the equipment in the room and placing new toys on the shelves.

The North, East, and West Laboratories share a central kitchen, library, and three equipment closets in which all of the indoor equipment such as puzzles, educational games, small wooden cars and trucks, rubber animals, numerous manipulative toys and science equipment is stored. There is a large,
spacious playground outside for the children's use with excellent outside equipment, some of which is permanent while other moveable equipment is stored in an adjacent garage.

Each child Development Laboratory has an accompanying observation booth containing a one-way glass through which the observer can view the children and hear their conversation through the audio screening above and below the glass. There are small tables, chairs, toilets and sinks suited for a child's use as well as moveable shelves for manipulative equipment. Each child has an individual locker for extra clothing and personal items as well as being a place of his own while he is at school. Each room contains a block area with different sizes and shapes of blocks, a manipulative area with equipment for small muscle development and intellectual stimulation, a housekeeping area containing child-sized furniture, a rug area where books, records, and a record player are located, and a jungle gym for large muscle development.

The Child Development Laboratories serve a dual purpose. One important functions is to provide three- and four-year-old children with learning experiences which will stimulate their overall growth and development and prepare them with the necessary skills for a more successful future. The children enrolled in the laboratories live in Logan or in near-by communities within Cache Valley. Many of the parents are associated with Utah State University in that they are teachers, secretaries, or perhaps students, while others may have no connection. The children are mainly from middle-class economic homes. Prior to attendance in the laboratory the child's name is placed on a waiting list until he comes of age and there is an available opening.
The second purpose of the laboratories is to give student teachers the training and experience necessary for them to become teachers of young children. During this time they learn valuable guidance methods, room arrangements for effective teaching such as: proper selections of books, records, and pictures; and management of the entire group of 20 children as well as learning to work with individual children. During the quarter each student teacher is responsible for planning two or more weeks activities around a central theme or concept at which time she becomes the Head Teacher and the other student teachers lend their support in carrying out the activities. The goals and objectives for each activity are listed on each lesson plan and are intended to reinforce the main concepts. The day is flexible; no two days are alike in composition.

One day there may be stories read to the group, a food experience, a musical experience, or an interesting visitor; while another day the children may participate in an art experience, a science experience, or go on an excursion to various places of interest on or off the campus. No matter how different each day's activities are, there is a special time set aside when a child is free to choose any area he desires to play in and use any of the equipment or facilities in the room. During this time children receive personal attention and extra help with any problems or questions they may have. It was during free play when the investigator asked individual children to go into another room to play a game with puzzles. The child was absent from his room for five to ten minutes two days per week for three weeks. The Library, a smaller room adjacent to the laboratory, was used for the practice sessions. There was a
small round table with chairs at which the investigator and child sat side by side while working with the puzzles.

**Instrument**

The instrument which was used in the study was developed by Teaching Resources. It consisted of six 6x10 inch picture puzzles depicting only one element, either an animal or a fruit. The pictures of a peach, apple, orange, dog, horse, and cat were realistic in drawing and color. There was a black border on each of the first four levels and last level in each set of puzzles. No border surrounded the picture on the fifth level. The border aids the child in attending to the task by limiting his visual field and by serving as a clue in putting the puzzles together. On the last level (level six) the fruit or animal was a black outline drawn on a white background. For developing visual perception, each puzzle is cut in such a way that a complete segment within each illustration is always shown—a stem, an animal's eye or a leg, and so forth. Within one puzzle set, as the tasks progressed, the size of the pieces was reduced and the number of pieces was increased. From the physical nature of the puzzles, they had the capacity to promote visual perception and provide the earliest type of reading readiness tasks.

Teaching Resource Materials consisted of six levels: Level one consists of the uncut puzzle, colored, with a border. Level two is the puzzle cut into two pieces from top to bottom, colored with a border. Level three puzzle is cut into three pieces horizontally, colored, with a border. Level four puzzle is cut into quarters (combining the vertical and horizontal cuts). Level five is
the same cut as level four but with no border. Level six is the puzzle cut as in level three, with a border and black outline without color. The teaching was accomplished through involvement of the child, and the experimenter giving him instructional cues on each level of the puzzles. See Figure 1.

Pilot Study

Five children, three boys and two girls, ages three and four were randomly selected from the two Child Development Laboratories at Utah State University. During free play periods in the laboratory, an individual child was asked to accompany the experimenter into another room to play a game with puzzles. A room next to the laboratory was used for each session. The child was seated on a chair at a small table with the experimenter sitting next to him. After a brief introduction and talking period with the child, such as learning the child's name and age, the following approach was taken:

Experimenter: I have some pictures of different fruits and animals that we are going to look at together, and then you will get to put some puzzles together to make the different pictures.

At this point Level one, which is the Introduction, was presented to the child in this way:

Orange
1. Here is a picture of an orange.
   I'll place it on the table so that both of us can see it.
2. Notice the black border around the picture.
   (Experimenter points to the black border.)
   We call it a black border because it is a black line that goes all the way around the picture.
3. Notice the stem on the orange.
   (Experimenter points to the stem.)
Figure 1. Illustration of the puzzle cuts in each of the six levels of fruit and animal picture puzzles.
Peach
1. Here is a picture of a peach.
   I’ll place it on the table so that both of us can see it.
2. Notice the black border around the picture.
   (Experimenter points to the black border.)
3. Notice the line on the peach.
   (Experimenter points to the line.)

Apple
The first and second instructional cues are the same as above cues substituting the word apple.
3. Notice the leaves on the apple.
   (Experimenter points to the leaves.)

Dog
The first and second instructional cues are the same as above substituting the word dog.
3. Notice the tongue of the dog.
   (Points to tongue)

Horse
The first and second instructional cues are the same as above substituting the word horse.
3. Notice the head of the horse.
   (points to head)

Cat
The first and second instructional cues are the same as above substituting the word cat.
3. Notice the tail of the cat.
   (points to the tail)

Second session
The experimenter placed the uncut puzzle on the table to the side of the child. The two pieces of the puzzle were then handed to the child face down.
The child was asked to put the pieces together to make the picture which was before him. The following instructional cues were given.

Orange
1. Here is a picture of an orange.
   I’ll place it on the table so that both of us can see it.
2. Here is another picture of an orange, but this picture has been cut into two pieces. Will you please put the two pieces together so that they make a picture that looks the very same as this picture.
3. Notice the black border around the picture.
4. Notice the stem on the orange.

The same procedure was followed using the same cues with the remainder of the picture puzzles on the second level substituting the appropriate words as called for. From the results of the Pilot Study, it was determined that the following changes would be made in the Main Study: The pictures in level one were to be presented twice at which time the experimenter will point out the specific objects he wishes to call to the child's attention. During the second presentation, the child will be asked to point to the objects which were previously shown to him. The presentation will be made in this way:

**Orange**

1. Here is a picture of an orange.
   I'll place it on the table so that both of us can see it.
2. Point to the black border around the picture.
   (Child points to the border.)
3. Point to the stem of the orange.
   (Child points to the stem.)

The second exposure will reinforce the first introduction which will better establish the concepts in the child's mind and enable him to participate and become more involved in the task. It was also determined to work with each child individually. By doing this, the experimenter is able to direct full attention towards the child and maintain closer personal contact with him. Each child is to be presented with two levels each week allowing two days between each session. The sessions are to extend over a period of three weeks until all five levels have been presented to the individual children. It was found that the child could very easily work through two levels a week. The most important consideration was to be sure all pictures on one level were presented
before the child was introduced to a higher level. This number of presentations gives the child enough exposure to the puzzles to enable him to remember what he is doing from session to session while at the same time not confusing him with too great a number of tasks to complete. It was determined that the length of each session would be from five to ten minutes as the children were more attentive and worked harder in this shorter period of time. During the Pilot Study many of the children put the puzzles together correctly but many times they were upside down or placed on an angle. Some of the children were unaware that they had placed their puzzles in a different position; therefore, for the Main Study there will be a line of tape placed on the table to indicate a base line with the intention that the child will see it as a bottom line and will place the bottom of the picture on the line. The child’s attention will be directed to the baseline and its purpose will be explained. It was learned from the author of a companion study that it would be most beneficial to the child if the order of presentation of fruit puzzles was altered. The orange was found to be one of the most difficult puzzles requiring greater discrimination. It was surmised that if the child put the easier puzzles together first, he would have a less difficult time putting the orange picture puzzle together. Consequently, the order of presentation of the fruits is to be peach, apple, and orange.

Sample

The experimenter selected 20 subjects from a group of 80 children who were between three and four years of age from the East and West Child
Development Laboratories at Utah State University. The children were given a pre-test to evaluate their present visual perception abilities, making certain that all children were to begin on the same level, and also enabling the experimenter to note any growth during the training sessions.

The last level (level six) of the fruit and animal picture puzzles served as the pre-test. It consisted of the puzzles drawn in black outline and cut horizontally into three pieces. The child was given no instructional cues during the test. From the results of the pre-tests, the children were divided into two groups under the condition that they were unable to put the last level of the puzzles together correctly. The first 10 boys and 10 girls meeting the criteria of the study (inability to perform the visual discrimination task) were retained for the main study. The names of the three year old girls and boys were placed into separate groups.

Three names were then drawn randomly from each group for the experimental group and the remaining names comprised the control group. The same procedure was followed for the four year old children until the experimental group was complete with three girls three years old, two girls four years old; three boys four years old, and two boys three years old, making a total of 10 children. The control group consisted of the same number of three-and four-year-old children. Age and sex of the child were the controlling factors in this study by which the investigator matched children in the experimental and control groups. The control group of 10 children received no training in visual perception activities. The other group of 10 children received training and practice through the use of the fruit and animal puzzles and served as the experimental group.
Main Study

Twenty children three and four years of age were randomly selected from the Child Development Laboratories at Utah State University. The children were administered a pre-test to evaluate their level of visual perception and also to enable the investigator to note additional growth during the sessions.

Pre-test

Each individual child was asked by the author to go into the Library, a room apart from the Child Development Laboratory to play a game. The child was assured at this time that he would be returning in just a few minutes. The last level (level six) of the fruit and animal puzzles served as the pre-test.

Experimenter: Today we are going to play a fun game with picture puzzles. I will give you puzzles of different fruits and animals and you can put the puzzles together to make the complete picture.

The child was then presented with the picture of the puzzle; first the fruits: peach, apple, orange and then the animals: dog, horse, and cat. The puzzles were drawn in black outline and cut into three horizontal pieces. The child put the puzzle together using his own judgment receiving no help or promptings while the investigator sat quietly beside him. When the child indicated that he was finished the investigator marked a score sheet, noting whether the child had put the puzzle pieces together correctly or incorrectly.

The children were divided into two groups under the condition of inability to put the puzzle pieces together correctly as indicated by the pre-test. The twenty children were matched by sex and age into a control group of five
girls and five boys which received no training or practice in visual perception activities. The other group of ten children, five girls and five boys, received additional practice and training in putting puzzles together and served as the experimental group. Twice for three weeks, approximately eight minutes in each session, these children in the experimental group worked individually with the puzzles and the author. The continuing sessions went as follows:

**First session (Level I, Introduction)**

This session served a dual purpose. It was intended to better acquaint author and child with one another thereby helping the child feel more at ease and comfortable during the sessions. Also it served as an introduction to the practice sessions which were to follow. The following approach was taken:

**Experimenter:** I have some pictures of different fruits and animals that we are going to look at together, and then you will get to put some puzzles together to make the different pictures.

The experimenter seated beside the child placed the uncut puzzle in front of him telling him about each picture as it was shown. The picture was then placed face down on the table. There was a strip of tape 1 inch wide and 10 inches long placed on the table to serve as a baseline for the child in placing the bottom of the puzzle on the line of tape. The different fruits and animals were introduced to the child in the following order, using the following instructional cues:

**Peach**

1. Here is a picture of a peach.
   I'll place it on the table so that both of us can see it.
2. Notice the black border around the picture.
   (Experimenter points to the black border.)
   We call it a black border because it is a black line that goes all the way around the picture.
3. Notice the line on the peach.
   (Experimenter points to the line.)

**Apple**
1. Here is a picture of an apple.
   I'll place it on the table so that both of us can see it.
2. Notice the black border around the picture.
   (Experimenter points to the black border.)
3. Notice the leaves on the apple.
   (Experimenter points to the leaves.)

**Orange**
The first and second instructional cues are the same as above substituting the word orange.
3. Notice the stem on the orange.
   (Experimenter points to the stem.)

**Dog**
1. Here is a picture of a dog.
   I'll place it on the table so that both of us can see it.
2. Notice the black border around the picture.
   (points to the black border)
3. Notice the tongue of the dog.
   (points to tongue)

**Horse**
The first and second instructional cues are the same as above substituting the word horse for dog.
3. Notice the head of the horse.
   (points to head)

**Cat**
The first and second instructional cues are the same as above substituting the word cat.
3. Notice the tail of the cat.
   (points to the tail)

During the second presentation of the pictures the child was able to participate and become more involved by pointing out the specific objects the experimenter had called his attention to earlier. Level one was the only level in which the pictures were shown twice. The second presentation preceded in this manner:

**Peach**
1. Here is a picture of a peach.
   I'll place it on the table so that both of us can see it.
2. Point to the black border around the picture.
   (Child points to the border.)
3. Point to the line on the peach.  
(Child points to the line.)

The same procedure was used in presenting the remainder of the pictures on level one to the child.

Second session (Level II)

The experimenter places the uncut puzzle to the side of the child. The experimenter hands two pieces of the puzzle cut vertically face down to the child and instructs him to put the pieces together to make the picture which is before him using the following cues:

**Peach**
1. Here is a picture of a peach.  
   I'll place it on the table so that both of us can see it.
2. Here is another picture of a peach, but this picture has been cut into two pieces.
3. Will you please, put the two pieces together so that they make a picture that looks just like this picture.
4. Notice the black border around the picture.
5. Notice the line on the peach.

**Apple**

The first, second, third, and fourth cues are the same as the above substituting the word apple for peach.

5. Notice the leaves on the apple.

**Orange**

The first, second, third, and fourth cues are the same as the above substituting the word orange.

5. Notice the stem on the orange.

**Dog**
1. Here is a picture of a dog.  
   I'll place it on the table so that both of us can see it.
2. Here is another picture of a dog, but this picture has been cut into two pieces.
3. Will you please put the two pieces together so that they make a picture that looks like this picture.
4. Notice the black border around the picture.
5. Notice the tongue of the dog.

**Horse**

The first, second, third, and fourth cues are the same as the above substituting the word horse.
5. Notice the head of the horse.

Cat

The first, second, third and fourth cues are the same as the above substituting the word cat.

5. Notice the tail of the cat.

Third session (Level III)

The next developmental level was the puzzle cut horizontally into three pieces. At this level, the number of pieces had been increased and their size decreased, but the method of presentation was basically the same as with the vertical cut in the second session.

Fourth session (Level IV)

In this session the child was presented with both vertical and horizontal cuts of the puzzle making four puzzle parts to each picture surrounded by a black border. This task was structured to provide the child an opportunity to consolidate his previous learning experience with the puzzles. At this level, it was determined that the child no longer needed the whole uncut puzzle before him as a guide; therefore, it was not presented.

Fifth session (Level V)

Progression through the levels have gradually become more difficult; therefore, in this session the puzzles are presented without a border. Subsequently the clue of observing the black border was eliminated. The vertical and horizontal cuts were again combined with the colored illustration to provide the child an opportunity to strengthen his ability in seeing the parts as contributing to the whole. The introduction of the puzzles without the black border
removes the support of limiting the child's visual field, thus conditioning the child to contend with the unlimited visual field of the printed page.

**Sixth session post-test**

The post-test is the same as the pre-test which consists of level six of the fruit and animal puzzles. The child was presented with the picture of the object drawn in black outline on white background cut into three horizontal pieces. The child was asked to put the pieces together to make a complete picture. During this period the child was not aided by instructional cues from the experimenter.

**Analysis of Data**

The statistical test employed in the study was the Chi-Square Goodness of Fit Test. It was used to determine whether any significant difference existed between the scores of the experimental group of 10 children and the group of 10 children in the control group on the task comprising the post-test. The test was also used to determine if there were any significant differences in the scores of girls and boys and older and younger children in the experimental and control group.

The investigator also determined from the results of the pre-test and post-test scores if there was any significant growth during this period of time in the visual perceptual abilities of children in the experimental group.
FINDINGS

The results of the testing did not confirm any of the hypotheses. Hypothesis One: Experience in visual discrimination tasks will have no effect in promoting visual perceptual abilities in children.

This hypothesis was not validated for the testing indicated that there was a significant difference in the scores of children on the pre-test and post-test at the .01 level of significance. Those children having had experience in visual discrimination tasks improved significantly over those children lacking such exposure.

Hypothesis Two: There will be no significant difference between girls and boys in the control and experimental group in their visual perception development as measured in the visual discrimination tasks.

This hypothesis was not confirmed. Testing results indicated that the girls in the experimental group improved significantly over the boys in the visual discrimination tasks as measured through pre-test and post-test scores. However, there was no significant difference in the visual perceptual development of girls and boys in the control group.

Hypothesis Three: There will be no significant difference in perceptual abilities of older and younger children.

This hypothesis was not validated in that the younger children in the experimental group increased their visual perceptual skills significantly over
the older children in the experimental group. There was no significant difference in perceptual abilities of older and younger children in the control group.

The task of the pre-test required the children to put together three pieces of picture puzzles, three fruits (peach, apple, orange) and three animals (dog, horse, cat). He was given a score of one point for each puzzle piece placed in the correct position. There were six picture puzzles with three points possible for each puzzle enabling the child to receive a total score of 18. The test was administered to many children, but those children able to complete the tasks successfully were eliminated while those children unable to put all the puzzle pieces together correctly were retained for the main study. The children in the study were equally divided by their sex and age into an experimental and control group. (See Table 1)

A comparison of the pre-test scores of the experimental group and the control group was made to be certain that all the children were beginning at relatively the same level. In the statistical analysis there was no significant difference at the .01 level in the scores of the experimental and control groups thereby indicating that all the children did begin on comparatively the same developmental level.

The experimental group of five boys and five girls received training and practice in visual perceptual activities twice a week for three weeks, six to ten minutes each session, while the control group of five boys and five girls had no training and practice. After the three week training sessions both the children in the experimental and control groups were given the same post-test for visual perception ability. The task the children completed for the post-test
Table 1. Age, sex, and pre-test scores for children in the experimental and control groups.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Age yr. mo.</th>
<th>Sex</th>
<th>Pre-test score</th>
<th>Subject</th>
<th>Age yr. mo</th>
<th>Sex</th>
<th>Pre-test score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kristy</td>
<td>3-3</td>
<td>F</td>
<td>1</td>
<td>Lesly</td>
<td>3-8</td>
<td>F</td>
<td>8</td>
</tr>
<tr>
<td>Susan</td>
<td>3-9</td>
<td>F</td>
<td>2</td>
<td>Julie Ann</td>
<td>3-6</td>
<td>F</td>
<td>7</td>
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<tr>
<td>Heather</td>
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<td>F</td>
<td>3</td>
<td>Julie</td>
<td>3-7</td>
<td>F</td>
<td>4</td>
</tr>
<tr>
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<td>4-2</td>
<td>F</td>
<td>7</td>
<td>Patty</td>
<td>4-3</td>
<td>F</td>
<td>12</td>
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<tr>
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<td>F</td>
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<td>Tonja</td>
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<td>F</td>
<td>8</td>
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<tr>
<td>Todd</td>
<td>3-8</td>
<td>M</td>
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<td>3-5</td>
<td>M</td>
<td>12</td>
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<tr>
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<td>3-5</td>
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<td>Kirk</td>
<td>3-7</td>
<td>M</td>
<td>9</td>
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<tr>
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<td>M</td>
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<tr>
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<td>11</td>
<td>David</td>
<td>4-9</td>
<td>M</td>
<td>9</td>
</tr>
</tbody>
</table>

Totals

Subjects 10
Sum of Pre-test Scores 71

was the same as the pre-test task in which the child was required to place together the three fruit and three animal puzzles of level six of the Teaching Resource Puzzles. The pictures were void of color being drawn in black outline and cut in three horizontal pieces. No instructional cues were given at this time enabling the child to complete the task using his own knowledge and skill.
The beginning pre-test scores of the children in the experimental group were compared to their ending post-test scores to determine if significant improvement in their visual perception skills had been made through the concentrated practice sessions. (See Table 2.)

Table 2. Pre-test and post-test scores of children in the experimental group

<table>
<thead>
<tr>
<th>Subject</th>
<th>Pre-test score</th>
<th>Post-test score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kristy</td>
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<td>Connie</td>
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<td>Kristin</td>
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<tr>
<td>Todd</td>
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<td>18</td>
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<tr>
<td>Kelly</td>
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<td>Bruce</td>
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<td>17</td>
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</tbody>
</table>

Totals

Subjects 10
Sum of Pre-test scores 71
Sum of Post-test scores 177
The testing indicated that there was significant difference in the scores of children on the pre-test and post-test at the .01 level of significance, which indicates a distinct improvement from the practice sessions.

The net difference in the pre-test and post-test scores of the experimental group children was determined to learn if one sex improved significantly over the other in developing their visual perceptual abilities. (See Table 3.)

Table 3. Net difference in pre-test and post-test scores of girls and boys in the experimental group

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Pre-test score</th>
<th>Post-test score</th>
<th>Sum of difference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Girls</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kristy</td>
<td>1</td>
<td>16</td>
<td>15</td>
</tr>
<tr>
<td>Susan</td>
<td>2</td>
<td>18</td>
<td>16</td>
</tr>
<tr>
<td>Heather</td>
<td>3</td>
<td>18</td>
<td>15</td>
</tr>
<tr>
<td>Connie</td>
<td>7</td>
<td>18</td>
<td>11</td>
</tr>
<tr>
<td>Kristin</td>
<td>9</td>
<td>18</td>
<td>9</td>
</tr>
<tr>
<td><strong>Subjects 5</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sum of Difference</strong></td>
<td><strong>66</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| **Boys** |                |                 |                   |
| Todd     | 11             | 18              | 7                 |
| Kelly    | 8              | 18              | 10                |
| Gregg    | 7              | 18              | 11                |
| Kirk     | 12             | 18              | 6                 |
| Bruce    | 11             | 17              | 6                 |
| **Subjects 5** |       |                 |                   |
| **Sum of Difference** | **40** | | |
The testing indicated that there was significant difference in the pre-test and post-test scores of the boys and girls. The improvement of the girls exceeded that of the boys from their pre-test to the post-test scores at the .01 level of significance. The girls responded with more rapid growth in this situation than the boys. In examination of the scores it is evident that the girls started at a lower level of development. Since all children reached maximum performance, the girls showed the greatest growth. However, if the instrument had offered greater opportunity for further progress, the boys may have shown as much growth as the girls.

There was a comparison of the pre-test and post-test scores of older and younger children in the experimental group to determine if age was a significant factor in the study. (See Table 2b)

The younger children improved significantly at the .01 level over the older children as indicated from a comparison of their pre-test and post-test scores. However, results indicated that both younger and older children made significant improvement in their visual perception abilities through the practice sessions. The testing indicates that younger children demonstrated more rapid growth through the practice sessions than the boys. A valid reason for this is because they started at a lower level. Since all children reached maximum performance, the younger children showed the greatest growth. If a different instrument had been used, older children may have shown as much of possibly greater progress as the younger children because of their maturity.
Table 4. Pre-test and post-test scores of older and younger children in the experimental group

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Age</th>
<th>Pre-test score</th>
<th>Post-test score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Older</td>
<td>yr. mo.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connie</td>
<td>4-2</td>
<td>7</td>
<td>18</td>
</tr>
<tr>
<td>Kristin</td>
<td>4-4</td>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td>Gregg</td>
<td>4-1</td>
<td>7</td>
<td>18</td>
</tr>
<tr>
<td>Kirk</td>
<td>4-8</td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>Bruce</td>
<td>4-0</td>
<td>11</td>
<td>17</td>
</tr>
<tr>
<td>Subjects</td>
<td>5</td>
<td></td>
<td>Sum of pre-test scores 46</td>
</tr>
<tr>
<td>Sum of post-test scores 89</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Younger</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kristy</td>
<td>3-3</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>Susan</td>
<td>3-9</td>
<td>2</td>
<td>18</td>
</tr>
<tr>
<td>Heather</td>
<td>3-7</td>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>Kelly</td>
<td>3-5</td>
<td>8</td>
<td>18</td>
</tr>
<tr>
<td>Todd</td>
<td>3-8</td>
<td>11</td>
<td>18</td>
</tr>
<tr>
<td>Subjects</td>
<td>5</td>
<td></td>
<td>Sum of pre-test scores 25</td>
</tr>
<tr>
<td>Sum of post-test scores 88</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A comparison of the pre-test scores to the post-test scores of the children in the control group was made. (See Table 5.)
Table 5. Pre-test and post-test scores of children in the control group.

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Pre-test Score</th>
<th>Post-test score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesly</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td>Julie Ann</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Julie</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Patty</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Tonja</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Johnny</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>Kirk</td>
<td>9</td>
<td>14</td>
</tr>
<tr>
<td>Eric</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Shawn</td>
<td>13</td>
<td>16</td>
</tr>
<tr>
<td>David</td>
<td>9</td>
<td>18</td>
</tr>
</tbody>
</table>

Subjects 10
Sum of pre-test scores 84
Sum of post-test scores 124

The testing indicated that there was significant difference in the scores of children on the pre-test and post-test at the .01 level of significance.

The difference in pre-test and post-test scores of control group children was determined to learn if one sex showed significant improvement over the other. (See Table 6.)

The testing indicated that there was no significant difference in the pre-test and post-test scores of the boys and girls.
Table 6. Net difference in pre-test and post-test scores of girls and boys in the control group.

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Pre-test score</th>
<th>Post-test score</th>
<th>Sum of difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Girls</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lesly</td>
<td>8</td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>Julie Ann</td>
<td>7</td>
<td>2</td>
<td>-5</td>
</tr>
<tr>
<td>Julie</td>
<td>4</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>Patty</td>
<td>12</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>Tonja</td>
<td>8</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>Subjects</td>
<td>5</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>Boys</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Johnny</td>
<td>12</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>Kirk</td>
<td>9</td>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>Eric</td>
<td>2</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Shawn</td>
<td>13</td>
<td>16</td>
<td>3</td>
</tr>
<tr>
<td>David</td>
<td>9</td>
<td>18</td>
<td>9</td>
</tr>
<tr>
<td>Subjects</td>
<td>5</td>
<td></td>
<td>24</td>
</tr>
</tbody>
</table>

A comparison of pre-test and post-test scores of older and younger children in the control group was made to determine if age was a significant factor in the study. (See Table 7.)

There was no significant difference between the scores of the older and younger children at the .01 level of significance.
Table 7. Pre-test and post-test scores of older and younger children in the control group

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Age</th>
<th>Pre-test</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Older</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patty</td>
<td>4-3</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Tonja</td>
<td>4-2</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Eric</td>
<td>4-1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Shawn</td>
<td>4-5</td>
<td>13</td>
<td>16</td>
</tr>
<tr>
<td>David</td>
<td>4-9</td>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sum of pre-test scores 44</td>
<td>Sum of post-test scores 64</td>
</tr>
</tbody>
</table>

| Younger  |       |          |           |
| Lesly    | 3-8   | 8        | 14        |
| Julie Ann| 3-6   | 7        | 2         |
| Julie    | 3-7   | 4        | 9         |
| Johnny   | 3-5   | 12       | 15        |
| Kirk     | 3-7   | 9        | 14        |
|          |       | Sum of pre-test scores 40 | Sum of post-test scores 54 |

A comparison of the post-test scores of children in the experimental and control group was made to determine if experience in visual discrimination tasks in concentrated and focused practice sessions would increase children's visual perceptual abilities. (See Table 8.)
Table 8. Post-test scores of children in the experimental and control groups.

<table>
<thead>
<tr>
<th>Experimental Group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subjects</td>
<td>Post-test score</td>
</tr>
<tr>
<td>Kristy</td>
<td>16</td>
</tr>
<tr>
<td>Susan</td>
<td>18</td>
</tr>
<tr>
<td>Heather</td>
<td>18</td>
</tr>
<tr>
<td>Connie</td>
<td>18</td>
</tr>
<tr>
<td>Kristin</td>
<td>18</td>
</tr>
<tr>
<td>Todd</td>
<td>18</td>
</tr>
<tr>
<td>Kelly</td>
<td>18</td>
</tr>
<tr>
<td>Gregg</td>
<td>18</td>
</tr>
<tr>
<td>Kirk</td>
<td>18</td>
</tr>
<tr>
<td>Bruce</td>
<td>17</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td></td>
</tr>
<tr>
<td>Subjects</td>
<td>10</td>
</tr>
<tr>
<td>Sum of post-test scores</td>
<td>177</td>
</tr>
</tbody>
</table>

The post-test scores of the total experimental group are significantly greater at the .01 level than the scores of the total control group.

It is evident from the high scores of the experimental group over the control group that the visual perceptual abilities of these children were increased through the practice sessions with discrimination tasks. Every child in the experimental group showed improvement in their visual perceptual ability at the end of the practice sessions. Eight of the ten children achieved a perfect
score on the post-test and the other two children, a boy and a girl, were only one and two points (respectively) away from a perfect score.
DISCUSSION OF FINDINGS

The children participating in the study especially those in the experimental group were most cooperative and enthusiastic in working with the author performing the required tasks. They happily accompanied the author into another room for each session and never displayed any undesirable behavior or reluctance to leave their room. This success was due in part to the explanation that the child would be able to play a special game, one which would be fun and also very short. It is believed that the required tasks were a challenge the child wanted to complete by himself. In several instances the child would say, "Now, don't write it down yet--I'm not finished." Upon hearing this, the author assured the child that he would have all the time he needed to complete the task.

Different children would again ask what the picture was going to be while moving the puzzle pieces into various positions. They became extremely excited when they fit together the pieces and saw that it was a particular fruit or an animal. Their faces beamed when they realized they had completed the task successfully by themselves.

They invariably made a comment to the effect that they liked the fruit, that they had eaten it, or that their mothers had bought some for them. They also made similar comments about the animals. Many children mentioned the animals size, that they had this particular animal for a pet, or that they liked the animal. It is believed that part of the success in the use of the fruit and
animal puzzles could be attributed to the familiarity the children had with the pictures presented to them. Another reason is that the puzzles were matched to their level of development.

It was interesting to note that in the first few minutes of the beginning sessions, a few negative comments were made such as: "I don’t know how to put them together." "I can't do it." But as the children found success in following tasks, they became more confident and motivated to proceed to the more difficult tasks. Many children noticed the number of puzzle pieces the picture was cut into and wanted to know how and why they had been cut.

Another interesting observation was that most children were aware when they had fit the puzzle pieces together correctly making their picture look exactly like the uncut picture in front of them. They often exclaimed, "My picture is the same as this one." "My picture doesn’t look right." One child usually mentioned upon completion of each task that her picture looked like the particular fruit or animal which ever it happened to be. When the pictures were presented in black and white, many children noticed this and mentioned that they were lacking color. Comments such as this were recorded: "They are white." "Now the doggie is white." "Look at the color of the peach, it's white." "Why is the apple white?"

Every child, with the exception of one, during one or more sessions placed his completed picture puzzle on an angle, on its side, or upside down. Despite the authors efforts to eliminate this error by placing a piece of tape on the table to establish a base line, this difficulty still persisted. However
the child's score was not altered in regard to this occurrence because the puzzle pieces were placed together correctly completing the requirements of the task. A possible explanation for this happening was that the children were more concerned and absorbed in the task of fitting the pieces together correctly to make a picture rather than with orientation of the completed puzzle.

In speculating why one little girl received a lower score than the rest of the children in the experimental group on the post-test, it was reasoned youngness and immaturity were the decisive factors. This particular child was the youngest of all the children, being only three years and three months old. Several times during the practice sessions she tired easily and became fidgety more quickly than any of the other children.

One of the most rewarding aspects of the study was to note how various children's confidence in themselves was increasing as they met with success during the practice sessions. Many comments such as this were made: "I know how to put them together." "I can do it." "I know how this goes." "This is going to be easy." "This is my easy one." "I'm mixed up; now I'm not mixed up."

This experimenter also helped to increase the child's self-concept by positive verbal reinforcement and praise when he had completed the task successfully.

Another interesting finding was that the fruit pictures were the most difficult puzzles for both the children in the experimental and control group. To be specific, the peach puzzle was by far the most challenging, the apple was second in difficulty, and the orange seemed to be the easiest. The orange
puzzle may have seemed easier to the children because they were more familiar with oranges than peaches. In the animal puzzles, the horse picture was by far the easiest puzzle for the children to complete successfully, the dog was second easiest, and the cat seemed to be the most difficult.

Testing results indicated that the girls responded with more rapid growth through the practice sessions than the boys. Upon further examination it is evident that the girls started at a lower level of development. Since all children reached maximum performance, the girls showed the greatest growth. However, if the instrument had offered greater opportunity for further progress, the boys may have shown as much growth as the girls demonstrated. The same theory holds true in terms of the children's ages. Older children may, with utilization of a different instrument, have shown as much growth as the younger children. It is possible that they may have even shown greater progress than the younger children because of their maturity. Therefore, sex and age were influential factors but their exact nature could not be determined because of the limit on progress imposed by ease of reaching maximum level of performance for boys and older children. There exists a need for an instrument which would offer more opportunity for growth to determine the total possible progress that could be made.

It was speculated that J. McVicker Hunt's "problem of the match" was solved in this study for the fruit and animal puzzles were successfully matched to the child's developmental level.
It was interesting to learn how valuable one hour of individualized training and instruction during a concentrated and focused practice session could be in fostering a child’s visual perceptual abilities.
SUMMARY AND CONCLUSION

Summary

The purpose of this study was to work with ten children three and four years of age in six different discrimination tasks to determine if the visual perception abilities of pre-school children could be increased through practice and experience in visual discrimination tasks. The instrument utilized in the study was fruit and animal picture puzzles developed by Teaching Resources. It consisted of three fruits; peach, apple, orange and three animals; dog, horse, and cat. The pictures were drawn on sturdy cardboard 6x10 inches and were realistic in color and representation of the object. For developing visual perception, each puzzle was cut in such a way that a complete segment within each illustration was always shown—a stem, an animal’s eye, leg, etc. Within one puzzle set, as the task progressed, the size of the pieces was reduced and the number of pieces was increased thereby graduating in difficulty at each level. The children were required to work through five of the six levels of the fruit and animal puzzles. The first level consisted of the uncut puzzle, colored, with a border. The second level puzzles were cut into two pieces vertically with a border. Level three puzzles were cut into three pieces horizontally with a border. The fourth level puzzles were cut into quarters with a border as were the puzzles on level five, but without the black border. The
teaching was accomplished through involvement of the child and the experimenter. Instructional cues were given to each child on every level of the puzzles.

Ten other children served as the control group subjects and received no training and practice in visual discrimination tasks. They were given the same pre-test at the beginning of the study and the same post-test at the end of the experimental group's training period of three weeks. This testing was done to determine whether practice in visual discrimination tasks would cause a significant increase in the child's visual perception abilities.

These hypotheses were formulated:

1. Experience in visual discrimination tasks will have no effect in promoting visual perception abilities in children.

2. There will be no significant difference between girls and boys in the control and experimental groups in their visual perception development as measured in the visual discrimination tasks.

3. There will be no significant difference in perceptual abilities of older and younger children.

The twenty children three and four years of age participating in the study were taken from two morning and two afternoon Child Development Laboratories at Utah State University. They were given a pre-test to make certain that all children were beginning as nearly as possible on the same developmental level. These children were then matched by sex and age and divided into two groups. One group of ten children, five boys and five girls, served as the control group and received no training in visual discrimination tasks. The other group of five girls and five boys, completed the experimental
group who met with the experimenter twice a week for three weeks from six to ten minutes each session for training and practice in visual discrimination tasks.

The author instructed and tested each child individually in the Child Development Library next to a Child Development Laboratory. The visual discrimination tasks and instructional cues were the same for each child. In the first session the investigator introduced the uncut pictures to the child with predetermined instructional cues which were continued in the following sessions. In the second session the child was required to put together the six pictures which were cut from top to bottom into two pieces. Session three required the child to put three horizontal pieces of the puzzles together. Session four increased in difficulty by requiring the child to put together four pieces of the picture puzzles. The same task was required in session five as in session four, but the puzzles were presented without the black border. The post-test was administered to both experimental and control group children in session six thereby completing the practice sessions. Level six of the fruit and animal puzzles was utilized for both the pre-test and post-test. For this task the children were to put together three horizontal pieces of the puzzles in which the objects on the puzzles were drawn in black outline without color but with a border surrounding the object.

The findings revealed that the visual perception abilities of children can be increased through practice and training in visual discrimination tasks. Both the boys and the girls improved significantly in their ability from their pre-test to their post-test scores. There was a significant difference between the scores of the girls and boys in the experimental group indicating that sex was an
influential factor in visual discrimination ability. There was a significant
difference between the scores of the three-year-old children and four-year-
old children confirming that age was an important factor in the study. How­
ever, both older and younger children made significant improvement. The
children in the experimental group scored significantly higher on the visual
discrimination tasks than did those children in the control group, which indi­
cates that practice and experience in discrimination tasks will increase a
child’s visual perceptual ability.

Conclusions

A series of brief, focused, tutoring sessions which constitute a
pleasant experience for a child can lead to his rapid advancement in a restric­
ted area of learning. If these sessions are anticipated with pleasure and are
later rewarded through the enjoyment the child receives, the sessions will
become increasingly valuable as positive learning situations. Age and sex of
the child influence the progress to be achieved in such a setting.

Suggestions for Future Studies

As a result of this study, the following suggestions for future studies
are made:

1. A similar study beginning with a small group of two children then
increasing the number in the group to determine how many children can be
taught successfully during a practice session with significant results.
2. A study with lower class children to determine what size of groups serve best in developing their visual perceptual abilities through practice sessions would also be interesting with valuable implications.

3. A further study utilizing an instrument in which none of the children could reach the maximum performance, thereby the total possible growth and progress of each child could be accurately measured.
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VITA

Candace Savage

Candidate for the Degree of

Master of Science

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Major Field: Child Development

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