To the Graduate Council:

I am submitting herewith a thesis written by Bonnie L. Comfort entitled "Testing Preschool Children's Skill Retention Using Microcomputers." I have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Industrial Education.

Donald V. Brown, Major Professor

We have read this thesis
and recommend its acceptance:

Accepted for the Council:

The Graduate School

TESTING PRESCHOOL CHILDREN'S SKILL RETENTION USING MICROCOMPUTERS

A Thesis

Presented for the

Master of Science

Degree

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Bonnie L. Comfort

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ABSTRACT

The purpose of this study was to determine if children enrolled in Title XX preschool centers would benefit from the use of microcomputers in the classroom.

A pretest, to test the child's matching skill was administered; from those children missing three or more problems, a random selection of 55 children (three and four years old) was made. These children were divided into a teacher practicing group, a computer practicing group and a testing control group. In each practicing group there were ten boys and ten girls and in the testing control group there were twelve boys and three girls.

A teaching session with each child individually took place before the child practiced the matching skill with the teacher or on the computer. After practicing seven minutes, the child took a session test. A post-test, the same as the pretest, was given with a day lapse after the session test. A testing control group took just the pretest and the post-test.

A two-tailed t-test of matched pairs was used to determine if there were significant differences between the pretest and post-test scores. A two-tailed t-test of unmatched pairs was used to determine if there was a significant difference between the teacher group and the computer group, between the boys and girls, and between the testing control group and the children receiving treatment.

The study indicates that by both the teacher and computer methods the children learned equally as well. There was a significant change in the testing control group between the pretest and post-test.

Observations and results indicate that preschool children will need exposure to a microcomputer before they will feel comfortable to work at it alone. The attention span of the three-year-old is very limited and an extensive computer program of the drill and practice type is not recommended.

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CHAPTER I

INTRODUCTION

Large corporations and companies have used computers for many years. These computers required a large amount of space for housing. The price was high and they needed a programer and specialist to repair the machine in case of a malfunction.

Through technology the computer has been improved and reduced in size, the result being the birth of the microcomputer. The significant reduction in the size of the microcomputer and cost, half the cost of five years ago, increases the demand and makes it more versatile.

The microcomputer is designed to be used by people in various occupations without a computer background. A wide variety of packaged programs on the market can be used to meet a large number of interest areas, increasing the number of people who can utilize the computer.

In learning situations, as in the school classroom, the computer is an additional means of communication between the teacher and the child. It will not take the place of the teacher because it does not have the flexibility needed in the classroom (Nolen 1980).

The computer is different from other media available in that communication between the child and the computer flows both ways; the child responds to the computer and the

computer reacts according to the input entered by the child (Lazarus 1982). This two-way communication gives the child a feeling of control over his learning and increases his self-esteem (Spencer 1983).

The computer has an undying amount of patience and will correct countless times without becoming frustrated or upset. It gives immediate feedback without the child waiting to see if he responded correctly (Zeiser 1983, Lazarus 1982).

Computer-Assisted Instruction (CAI) programs can be used to reinforce the subject area the teacher has taught. Through a drill and practice program the child can review the concept over and over until he chooses to end his review (Spencer 1983).

Also through a CAI program, the computer can be used as a remedial or individual method to accompany the concept taught by the teacher. This method presents the same material on several skill levels. The child or teacher can make the selection of the level to be used (Zieser 1983).

In addition to using specific CAI programs, young children can also program the computer. Seymour Papert believes this is the way to use computers with children. He has had three-year-old children begin to program the computer. Through this method the child learns much through incidental learning (Tursman 1982).

The majority of research involving computers and children uses large computer systems and children in the third grade and above (Spencer 1983). Even with the progress that has been made in computer technology with microcomputers, it is not yet a common sight to see a computer in the preschool and nursery school setting.

Nursery and preschool children are non-readers and would require either an adult working on an individual basis with each child or a voice synthesizer, like the "Supertalker," so there could be verbal communication between the child and the computer, to take the place of reading from the screen. "Supertalker" allows the child to work independently at the computer (Von Stein 1983).

I. STATEMENT OF THE PROBLEM

Since computers are becoming more readily available and are seen more consistently in the learning environment, Title XX preschool agency operators and directors will be encouraged by sales companies to include a computer setup at their facility.

Is there a place in the preschool child care center for computers? Can they provide the individual feedback preschoolers need to develop at their own pace?

With the limited amount of research that has been done with preschoolers and computers, the answers to these questions become very important when considered during the

planning of a curriculum. It is necessary for more studies involving preschoolers and computers to be conducted to assist in answering these important questions.

II. OBJECTIVES

The objectives of this study are:

1. ~~To determine if the matching skill was learned.~~

2. ~~To determine if~~ the matching skill ~~was~~ learned more successfully by children practicing with the teacher or on the computer.

3. ~~To determine if~~ the retention level of the matching skill ~~was~~ significantly greater for children practicing with the teacher or for those children on the computer.

4. ~~To determine if~~ there ~~was~~ a significant difference, between boys and girls in learning the matching skill when practicing with the teacher or when working on the computer.

III. LIMITATIONS

The children who participated in this study were boys and girls, three and four years old, enrolled in two Title XX preschool agencies: Knox Nursery Schools and Knoxville's Community Development Corporation, hereafter referred to as KCDC.

Title XX child care centers are funded in part by the Federal Government through the Department of Human Services to serve low-income families. The main purpose of a Title

XX center is to provide good quality care and an individualized developmental program for children while their parents are working, attending school, or in a training program. Children are also enrolled if they show a delay in one of five developmental areas that include social skills, language, cognitive skills, self-help skills and motor skills. Children that are referred by the Department of Human Services because of abuse or neglect are also enrolled.

Title XX centers have an income quota, according to family size, that families must fall below to be eligible for this program. If eligible, a sliding fee scale is used to determine the fee per week for children enrolled. Many of the parents enrolling their children are single-parent households and receive monthly financial assistance, Aid For Dependent Children, from the government. Therefore, most of the parents enrolling their children do not have to pay a fee.

There is a third Title XX agency in Knoxville; however, the number of three and four year olds they enroll is less than fifteen and so was not included in this study.

IV. SIGNIFICANCE OF THE STUDY

Taking into consideration the limitations, this study provided needed information in the area of using computers

with Title XX preschool children. This study also answered questions about a preschool child's retention when using a computer.

V. ORGANIZATION OF THE STUDY

This chapter presented an introduction, statement of the problem, objectives, limitations, and the significance of the study.

Chapter II presents a review of the literature and studies including the use of computers in schools, computer-assisted instruction, and the LOGO computer language.

Chapter III presents the procedures that will be used to conduct the study; the subjects and the method of their selection; the testing material, pretest/post-test and session test; and the scoring of the tests and the statistical treatment used.

Chapter IV presents a summary of the testing data and an analysis of that data.

Chapter V presents a summary of the entire study, draws conclusions based on the study, and makes recommendations.

CHAPTER II

REVIEW OF THE LITERATURE

INTRODUCTION

Literature and observation indicate to us that the computer is here to stay. Our lives are beginning to be influenced by the computer at the grocery store, at the bank, and in our entertainment. In addition to places of business using the computer on a daily basis, our educational institutions use the computer.

In this chapter, literature pertaining to the use of computers in the school system, with particular emphasis on the elementary and preschool child, will be reviewed. Included will be literature discussing the many questions and concerns teachers express about young children having access to the computer in the classroom.

I. ~~USING~~ MICROCOMPUTERS IN EDUCATIONAL SETTINGS

Computers have two basic uses in the educational setting: to meet the administrative needs and for use in the classroom with students and teachers. Computers help reduce the amount of time administrators spend on administrative tasks, which allows increased time to be spent with students, teachers and parents (Geiseit 1982, Dinkmeyer 1983). In many schools, because of limited funds, it is not possible to have a terminal for every classroom or each

student. In these schools, one or several terminals may be housed in a separate "computer" room that is used by all the teachers and students. Many times, only a limited number of students are given permission to use the "computer" room.

However, microcomputers are becoming more and more common in the classroom. They have been used in the high school classroom for some time and have slowly moved into the middle and elementary schools. Where there is a computer readily available in the classroom, Geiseit lists the four basic educational applications for its use:

1. As an instructional management tool
2. To teach computer literacy
3. For drill and practice of a lesson
4. For a teaching medium by determining immediately the level of learning

Computers are effective in the classroom only if the software is. In selecting software or writing a program Dinkmeyer suggests that consideration should be given to these four areas:

1. Is the program teaching the proper content to the students?
2. Does the program hold the student's attention?
3. Is there supplemental material to accompany the computer program?
4. Can the program be integrated into the curriculum?

When the computer is used effectively in the classroom,

it allows for an additional type of communication to take place between the teacher and the child.

II. TEACHER'S FEARS OF THE COMPUTER

When the topic of computers comes up in conversation, teachers tend either to feel the computers are the way of the future and should be in each classroom, or feel that computers are a good tool but don't want them in their classroom. Another fear is that the computer will dehumanize education and will replace the teacher in the classroom (Martellaro 1981, McDonald 1982). Another author stated that experience reveals that the teacher being replaced by the computer is much exaggerated (Joiner 198Ø).

A teacher's hesitancy toward using the computer in his/her classroom can be caused by a variety of things beyond the replacement factor. The teacher may not be sure that using the computer has some beneficial purpose and is valuable in the teaching of the subject matter. The more complex new media (computer) is, the longer it will take the teacher to use it. The computer is considered to be one of the most complex machines to be introduced into the classroom in this century. If new media for education can be tested and proven effective, they will be accepted much more rapidly then if pretesting has not been done.

Teachers will accept new media sooner if they can visually observe the results that they produce. With a

computer, it is not always possible to see the positive effect that a computer has had with a student. There is also the concern that the student will progress at a more rapid pace than the teacher, causing embarrassment.

Several innovations in the past were supposed to revolutionize education. These innovations, though expensive, failed to live up to their expectations. Many teachers and administrators see the computer as another innovation that might fail, so they hesitate to make the purchase (Martellaro 1981).

III. COMPUTER LITERACY FOR TEACHERS

To acknowledge these fears that some teachers experience is the beginning to finding a solution so that children can be exposed to the computer world. A significant part of dispelling these fears toward using the computer in the classroom is a course discussing basic computer awareness and computer literacy. In addition to the knowledge that the teacher gains, this type of course provides the opportunity to the school to introduce the computer to the classroom with a limited amount of equipment and expertise (McDonald 1982, Geisert 1983). The success of the computer in the classroom is and will be determined by the teacher's ability to either write or select software appropriate to the lesson being presented and then to follow up with activities that support the computer lesson.

IV. WHO IS THE COMPUTER FOR?

All children in the classroom should have the opportunity of working on a computer. However, many teachers feel that the computer should be used by only certain groups of students. These students very often are the advanced or gifted students (Martellaro 1981). Some other groups of students selected for using the computer are handicapped and resource students.

Advanced students are selected because they tend to need less supervision, catch on to new ideas easily, and are stimulated by a challenge. It is necessary for them to do more than just running programs; they should be writing their own programs. Leimbach listed some of the necessary skills in program writing:

1. Interpreting information
2. Translating thoughts and ideas
3. Predicting outcomes
4. Planning logical sequence
5. Applying deductive reasoning
6. Analyzing and correcting program errors
7. Evaluating alternative methods
8. Developing original ideas

When the computer is used with the slow student, because it is an enjoyable medum to work with, it can be used as a motivator and reinforcer (Spencer 1983, Leimbach

1982). It gives the student a sense of control over his/her learning and so helps to increase his/her self esteem. The computer acts as a patient tutor and has an uninterrupted attention span and doesn't show negative emotion when the wrong answer is presented (Lazarus 1982, Spencer 1983, Geoffrion 1981).

Computers are suitable for all students and can be used in all classrooms. Teachers teach by example, demonstration, excitement, explanation, and encouragement. The computer provides an additional medum for the teacher to use in communicating the lesson to the students.

V. COMPUTER-ASSISTED INSTRUCTION

Computer-Assisted Instruction (CAI) is the most common type of program found in the classroom today. CAI programs have been around for over fifteen years but just in the last few years they are more available and used more. This increase in use has occurred because microcomputers are now being used in the classroom and the cost has dropped (Martellaro 1981).

There are a large number of CAI packaged programs on the market for a wide variety of subjects. An advantage of using a packaged CAI program is that the teacher needs no programming skills to use the computer successfully in the classroom with the students.

CAI programs allow for releasing students from the

rigidity and inflexibility of group instruction (Joiner 1980). The computer becomes a means for learning a specific lesson on the student's individual level, in various subject areas; and the difficulty can be selected by either the student or teacher (Von Stein 1983).

Most programs for the preschool child are of the skill, drill and practice type (Zeiser 1983). These programs take the format of right or wrong answers. They give immediate feedback so the child is made aware of the correct answer, sometimes giving a second chance for the correct answer to be chosen.

VI. LOGO

The major part of published literature about computers has not directly concerned the preschool child. Most CAI programs require a minimum amount of reading for the child to work at the computer independently. Because preschoolers are nonreaders, they require either individual assistance in reading the instructions or a voice synthesizer to use the computer and the CAI programs. Geoffrion suggested another concern with CAI programs: that young children are not as interested in answering questions as they are in spending time exploring all the possibilities of a new media.

In response to these concerns, Seymour Papert developed a new program language called LOGO. He particularly had the very young child in mind and began by having the child draw

scribbles by pressing various keys that move the "turtle" around the screen. With control, skill, experience and understanding the scribbles become recognizable pictures. The child can name the picture, and the directions for drawing that picture will be stored for use at a later time. The child can then draw another picture including previously named pictures or draw an entirely new picture.

This is the beginning of programming and using logic. LOGO allows children to gain control over their learning process. By using a different way to learn using a logical process, these children are learning to solve problems logically (Papert 1982, Streibel 1983).

Debugging gives children an opportunity to learn from their mistakes. Through the debugging process of a program the results are immediate. If a programmer successfully debugs a program, it will run! Preschool children need immediate feedback to encourage them to keep moving forward.

Experience shows that young children become excited and take the lead while exploring a particular program idea. It is necessary for the teacher to take a back seat and to observe instead of interfering, even though the results may not be what was expected (Streibel 1983).

VII. PROBLEMS WITH YOUNG CHILDREN AND COMPUTERS

Some problems exist beyond the reading problems when using computers with preschoolers. Some experts recommend

no more than twenty to thirty minutes a day at the computer, as children tire more quickly than at book activities because of the demands the computer makes (Joiner 1980).

Many children in kindergarten have not yet gained the visual-tactile (eye-hand coordination) necessary for writing. At this age, children are still struggling to copy simple sentences from a text book. Putting a computer screen in front of them, Getman beleives, can only frustrate them.

The computer screen is tremendously more demanding than textbooks. Part of this difficulty is because of the relationship of the hands to the eyes. They are working at different spatial positions, creating a type of stress that is not found in any other desk activity (Getman 1983).

Social behaviors in forty-five first graders were studied by Sears and Feldman in 1968. Computer-Assisted Instruction was given to these first graders for thirty-five minutes each day for a year. The academic and social behaviors of these children were then measured and compared in the same areas to twenty-seven other first graders who were teacher-taught.

The scores in this study at the end of the school year were compared to scores at the beginning of the school year. The social behavior scores of the children using the CAI program decreased while the scores of the teacher-taught children significantly increased.

The results of this research indicated that when the CAI programs were used consistently with first graders, the children became less socially oriented than children who worked with a teacher instead of a computer. The results also indicated that CAI programming may reduce the expected positive relations among academic behavior, IQ and achievement for first graders.

VIII. SUMMARY

Computers are becoming more and more a part of our everyday lives, and they are playing a larger and larger role in all aspects of our educational system. For the office administrator to the classroom teacher, there are computer programs available to meet various needs. Computers are making it possible for administrators to spend more time away from the office routine and more time with people. When there are computers available to the classroom teacher, they are encouraged to use them. However, some teachers are having a problem adjusting to this computer age. They do not understand the computer or the computer language, and they are afraid that the ability and patience of the computer might leave them without a job. The reality is that the knowledge, understanding and caring of the teacher cannot be replaced by the computer. To help the teacher believe this reality and to better understand the

language of the machine, courses in computer literacy are necessary.

The frequency of elementary classrooms having access to a computer is greater than a few years ago. In many schools the use of the computer is limited to gifted children or children in special programs. The computer is just now appearing in low elementary grades and preschool centers.

Are preschool children ready for personal involvement with the computer? Seymour Papert developed a new computer language, LOGO, so that three- and four-year-olds can use the computer. He thinks that not only are young children ready to use the computer but they should be taught to program it. On the other side, there are educators who believe that the preschool child is at a very important stage of developing social skills and eye-hand coordination skills and therefore is not ready for the complexity of the computer.

CHAPTER III

METHODOLOGY

I. SUBJECTS

Forty children, twenty from KCDC and twenty from Knox Nursery Schools, participated in the treatment portion of this study. These participants included ten boys and ten girls from each agency. Fifteen children, ten from KCDC and five from Knox Nursery Schools, participated in the testing control group.

Both the boys and the girls ranged in age from 3.Ø to 5.Ø years. One boy and one girl turned five by the conclusion of the study.

All parents from both agencies who had children above three years old and below five years old were sent a letter requesting permission for their child to participate in this study. Only those children returning signed permission forms took the pretest. A copy of the permission letter is in Appendix A.

A total of 134 children took the pretest. Children incorrectly matching three or more symbols in the pretest were eligible to participate in the study. A copy of the pretest/post-test is in Appendix B.

A stratified random sample design was used for the

treatment groups. From the eligible children, four different groups of names (KCDC boys and girls, and Knox Nursery School boys and girls) were put into a box and stratified random selection was made by a disinterested party. From each group, five names were pulled for the computer practice and five names were pulled for the teacher practice.

The names of the remaining eligible children from both agencies were then placed in the box and names of fifteen children, twelve boys and three girls, were selected to take the pretest and post-test. This testing control group was used to determine any improvement resulting from just taking the test.

II. LOCATIONS

The researcher met with the director of the Knox Nursery School program to discuss the study. Their participation in this study was granted after the director received a letter explaining the study. A copy of this letter is shown in Appendix A.

The three KCDC centers were located in housing developments in separate areas of Knoxville, while the four Knox Nursery School centers were located in elementary schools in separate areas of Knoxville. Three of the Knox Nursery School centers serve the same area as the three KCDC centers.

Children were assigned to three different types of classroom age groups. There were thirty-four children in the study assigned to a multi-aged (two and a half years to six years) classroom. There were sixteen children in the study assigned to a room consisting of three- and four- or four- and five-year-olds. There were five children in the study assigned to a room consisting of only four-year-olds.

III. TEACHING SESSION

Each child came individually to a separate area of the building that they were familiar with and that was not occupied by other children. The teacher demonstrated four different matching activities that required the child's involvement.

1. Three blocks of different shapes and different colors were placed in front of the child. A similar block of the same color and shape was shown to the child and the child was asked, "Where is another block just like this one?" This activity was repeated for each block. If a child did not seem to understand, then the activity was repeated.

2. Four small teddy bears (red, green, blue, and yellow) were placed in front of the child. Another teddy bear was shown to the child and the child was asked, "Which teddy bear is just like this one?" This activity was repeated eight to ten times.

3. Ten blocks, different shapes and colors, were lined up in front of the child. A similar block of the same color and shape was shown to the child and the teacher asked, "Can you find a block like this one?" The block was then placed behind the first block. This activity was repeated seven to ten times.

4. Six pictures of children, in circles of equal size, were placed on the table in front of the child. An exact picture was shown to the child and the teacher asked, "Which picture looks just like this one?" The two pictures were then placed together on the table. If a child had difficulty with this activity, then it was repeated.

At the completion of the fourth activity the child was finished with the teaching component and ready for the practicing session.

IV. PRACTICING SESSION

The practicing session for both the teacher-directed and the computer session consisted of two types: matching numbers and matching letters.

The amount of time spent on each type of matching was about three and a half minutes. The teacher, using a watch, limited the practicing session to seven minutes.

At the conclusion of the practicing session the child was given a test similar to the pretest. Later, this test would indicate if the child learned the matching skill.

The teacher-directed practicing session was continued in the same place (table and chair) that the matching demonstration was. Ten number cards (from zero to nine) were lined up, in random order, on the table. The teacher held a similar card in front of the child so that the numbers on the table were visible and asked, "Can you find another one that looks just like this one?" The teacher's response when the child pointed to the correct number was "Good for you!" A pat on the back was also given. The two numbers were then placed together on the table and another number card was shown to the child. If the child responded incorrectly, the teacher responded with, "No, try another number." After the child correctly matched all ten numbers, one set of the numbers were turned upside down on the table and mixed up. The child then was asked to pick a card, turn it over, and try to match that number with the cards face up on the table. This game was played until about three and a half minutes had passed since the beginning of the practice.

Scrabble chips were used to match the letters. About twenty letters were placed in random order on the table in front of the child. Each letter was placed in a right-side-up position. As with the numbers, the teacher held a similar scrabble chip and asked "Can you find another one like this one?" The teacher gave the same response as with the numbers. The two like scrabble chips were then

placed together on another part of the table. At the conclusion of another three and a half minutes the practicing session was completed. The child continued to sit in the same seat to take the session test.

For the children participating in the computer practicing session, when the teaching session was completed the child moved to another chair at the computer nearby. The computer was not always in the same stage of readiness for all the children. If the program was not ready to run, the child was asked not to touch the computer until the game was ready to play. On those occasions the child had to wait about fifteen seconds. When run, the program produced a single random number, between one and nine, in the middle upper screen and waited for the number to be matched. The teacher demonstrated how to use the computer or "play the game" by placing the child's finger directly under the number on the screen and then placing the child's finger on the correct key on the keyboard. When the happy face appeared on the screen due to correctly matching the number, the child's attention was brought to the screen and the teacher mentioned that if the number was matched the happy face would show up. The child was encouraged to continue practicing by matching each number on the screen. If the child pressed the correct key, the happy face would show up, and then another number appeared. If the child pressed an

incorrect key, nothing happened and the same number waited to be matched.

After about three and a half minutes of matching numbers, the teacher pressed the "escape key" on the computer and a random letter appeared on the screen. The teacher demonstrated, by using the child's finger, how to match the letter on the screen by pressing the correct letter on the keyboard. The same results occurred as with the numbers. After practicing for a total of seven minutes on the computer, the child returned to the table to take the session test.

V. INSTRUMENTATION

The two instruments that are used in this study were developed by the researcher. They were designed to be understood and used by the children with a minimal amount of verbal instruction. Each instrument was made into booklet form with one matching problem on each page. The symbol to be matched was set apart on the page by being placed at the top. There were four choices at the bottom of the page for the child to choose from.

The pretest/post-test had a place for the date, child's name, birthdate, and a box to indicate if the pretest or post-test was being taken. It began with two examples that were done as a group. The first example was an apple. The choices were common objects including an apple. The second

example was a completed house with a window, chimney and door. The choices were houses in various stages of completion including a completed house. There were twelve matching problems to be completed. All of the problems consisted of numbers or letters to be matched, with every other page being a number page and every other page being a letter page.

The session test had a place for the child's name and the date. It had no examples, but used the same format as in the pretest/post-test. This test contained eight matching problems and were of letters and numbers, on alternating pages. Different letters and numbers were used in the session test than in the pretest/post-test. A copy of the session test can be found in Appendix B.

VI. PROCEDURE

The researcher, hereafter referred to as teacher, went to each center and took four children at a time to a separate area, with all the children sitting at the same table to take the pretest. In one center it was possible to have a center teacher assist in giving the pretest. Each child was given a pretest booklet with his/her name on it. The children were asked to put their finger on the apple. Some of the children put their finger on the lower apple. Those children were encouraged to find another apple at the top of the page. When all four children had their finger on

the top apple, they were given a crayon and asked to mark the apple. Then they were asked to find another apple and mark it. Many of the children showed concern about how to mark the apple and watched the other children at the table to see what they would do. The next instruction was to turn the page and look at the houses. They were asked to mark the house at the top and find another house just like it and mark it. The researcher found that most of the children had difficulty in seeing a difference in the houses at the bottom of the page.

Giving few instructions, when a child was ready to continue, the teacher turned the next page for the child and pointing to the top symbol said, "Mark this one." After the child marked the symbol, the teacher said, "Find another one just like it and mark it." Then the instruction was, "Turn the page and do another one." The teacher moved among all the children with these same instructions and encouraged them until they completed the booklet. With some of the older children who took the pretest, the initial instruction was adequate for them to work on their own and complete the task. However, with many of the younger children, with the turning of each page complete instructions had to be given again. Even when a younger child matched two symbols after marking the correct symbol, the child would mark the other symbols at the bottom of the page. Therefore the children were given verbal instructions to turn each page or the teacher turned the page for them.

The teacher checked the booklets to verify that all children marked each page. They were then taken back to the classroom and the next group of children was tested.

The session test was given at the conclusion of the practicing session. The teacher gave the child a crayon and pointed to the symbol at the top of the page and said, "Mark this one." After the child marked the symbol, the teacher said, "Find another one just like it and mark it." A lapse of one day occurred between the session test and the post-test, during which time the teachers were requested not to teach the subject area. If the child was absent on the day of the post-test, then it was given the following day. There were six children, two girls and four boys, who were absent on the day of the post-test and took the post-test the following day. Children participating in the study had to complete all three tests for their scores to be considered.

Children comprising the testing control group were given the post-test at the same time that the other children in their center took the post-test. Instructions were the same for all children.

VII. SCORING AND STATISTICAL ANALYSIS

On the pretest/post-test the two examples of the apple and house were not scored. On the remainder of this test

and the session test a problem was marked wrong when:

1. the child marked an incorrect match
2. the child marked more than one bottom symbol
3. the child marked no bottom symbols

A check was then placed in the upper righthand corner and all checks were counted to determine the number of matching problems missed. This number was then placed in the upper righthand corner on the front page.

At the conclusion of the study, all the booklets were placed in a stack to have the scores recorded. As each score was recorded, a number was assigned to take the place of the child's name.

A t-test for matched pairs ~~was~~ will be used to determine if mean scores ~~were~~ are significantly different when comparing the teacher group and computer group. A t-test for unmatched pairs ~~was~~ will be used to determine if the mean scores between the combined groups (teacher and computer) and the testing control group ~~were~~ are significantly different.

Para Analysis

CHAPTER IV

RESULTS AND DISCUSSION

I. PROBLEM REVIEW

The purpose of this study was to determine if preschool children would learn the matching skill more successfully when practicing with a microcomputer than with a teacher. This purpose was based on the assumption that children are fascinated with computers, as seen through the playing of video games, and that the computer would give an immediate reward, happy face, for the correct answer.

Another purpose was to determine if the retention level of the matching skill was greater for children practicing on the computer than children practicing with the teacher. The assumption was made that children using the computer would enjoy learning the matching skill more and would therefore retain the learned information for a longer period of time.

The teaching portion of this study began with very simple color-shape matching and became increasingly more difficult until the child had achieved the fourth and last activity, matching pictures of people. This activity was the most difficult because many of the people in the pictures were similar.

There were 134 children who took the pretest. Those who missed more than two matching problems were selected randomly for a learning and practicing session either by a

teacher or on a computer. All 40 children who participated either in the teacher practicing or the computer practicing group took the session test immediately following the practice session. The post-test was given one day following the session test.

These steps were taken to determine which group of children, teacher or computer, learned the matching skill more successfully:

1. An analysis of the individual scores on the pretest and session test.

2. A comparison of the combined scores, girls and boys, in each group, computer and teacher, on the pretest and session test.

To determine which group of children, teacher or computer, retained the matching skill best, these analyses were made:

3. An analysis of the individual scores on the session test and post-test.

4. A comparison of the combined scores, girls and boys, in each group, computer and teacher, on the session test and post-test.

To determine if boys or girls from the teacher group or the computer group learned the matching skill best, one analysis was made:

5. A comparison of the scores for boys (B-1, B-2,

etc.) and girls (G-1, G-2, etc.) on the pretest, session test, and post-test to determine if there was a significant difference.

Three comparisons were made to determine if the control group, having no treatment, improved when taking the post-test:

6. A comparison of the pretest and post-test scores of the control group.

7. A comparison of the pretest scores of the control group and the children who participated in the practicing sessions.

8. A comparison of the post-test scores of the control group and the children who participated in the practicing sessions.

II. STATISTICAL RESULTS

One hundred thirty-six signed permission forms were returned for children to participate. Of that number, 134 children took the pretest. After scoring the pretest there was a total of seventy-two children who were ineligible for the study. The reasons for being ineligible were: sixty-nine children demonstrated a mastery of matching since they missed fewer than three matching problems, one child did not complete the pretest, one child had turned five, and one child was not returning to school. Sixty-two children or 46.3% were eligible to participate in the study.

Of the fifty-five children randomly selected, 60% were three years old and the remaining 40% were four years old. Of the twenty-three girls selected, 65% were three years old and 35% were four years old. Of the thirty-two boys selected, 56% were three years old and 44% were four years old.

There were twelve matching problems in the pretest/post-test and eight matching problems in the session test. Due to this difference in number of problems, scores were converted into percentage scores before they were compared. Table 1 illustrates the individual raw score and percentage score for the pretest, session test, and post-test by teacher group or computer group.

Objective 1

To determine if the matching skill was learned, a two-tailed t-test for matched pairs was used. Table 2 shows the mean percentage scores for the pretest, session test and post-test. There was a significant difference between the pretest and post-test scores and between the pretest and session test scores, which indicates that the matching skill was learned. There was no significant difference that occurred between the session test and post-test.

Objective 2

To determine if the matching skill was learned more successfully by children practicing with the teacher or on

TABLE 1

INDIVIDUAL RAW SCORES AND PERCENTAGE SCORES FOR PRETEST, SESSION TEST, AND POST-TEST DIVIDED BY TEACHER GROUP AND COMPUTER GROUP

	Pretest		Session test		Post-test	
Child's number	raw score	% score	raw score	% score	raw score	% score
TEACHER GROUP						
G-1	9	75	7	88	10	83
G-2	5	42	3	38	11	92
G-3	3	25	4	50	4	33
G-4	9	75	7	88	12	100
G-5	7	58	5	63	8	67
G-6	1	08	2	25	1	08
G-7	9	75	7	88	11	92
G-8	2	17	5	63	9	75
G-9	4	33	6	75	11	92
G-10	1	08	2	25	7	58
B-1	6	50	5	63	11	92
B-2	5	42	6	75	9	75
B-3	7	58	8	100	9	75
B-4	4	33	7	88	8	67
B-5	9	75	8	100	9	75
B-6	9	75	6	75	10	83
B-7	5	42	8	100	10	83
B-8	7	58	7	88	8	67
B-9	9	75	7	88	10	83
B-10	0	00	3	38	2	17
COMPUTER GROUP						
G-11	9	75	5	63	8	67
G-12	2	17	2	25	4	33
G-13	2	17	0	00	6	50
G-14	3	25	6	75	12	100
G-15	8	67	6	75	9	75
G-16	2	17	3	38	9	75
G-17	6	50	5	63	11	92
G-18	8	67	8	100	9	75
G-19	9	75	8	100	7	58
G-20	9	75	7	88	11	92
B-11	8	67	7	88	11	92
B-12	3	25	3	38	8	67
B-13	3	25	6	75	9	75
B-14	7	58	8	100	12	100
B-15	3	25	5	63	9	75
B-16	1	08	1	13	2	17
B-17	3	25	6	75	8	67
B-18	2	17	2	25	4	33
B-19	4	33	4	50	7	58
B-20	8	67	7	88	7	58

TABLE 2

MEAN PERCENTAGE SCORES OF PRETEST, SESSION TEST, AND POST-TEST
FOR CHILDREN TAKING ALL THREE TESTS
(N = 40)

Mean % Scores			Standard Deviation			
Pretest	Session test	Post-test	Pretest	Session test	Post-test	*t value
44.0		69.4	24.3		23.2	7.39788*
44.0	66.5		24.3	27.1		7.77753*
	66.5	69.4		27.1	23.2	.83976

* T value > 2.042 for 39 degrees of freedom is significant at .05 level.

the computer, a two-tailed t-test for unmatched pairs was used. Table 3 shows the results of the t-test comparing the teacher group and the computer group on the session test. There was no significant difference. The t-test comparing the teacher group and the computer group on the pretest showed there was no significant difference for the teacher group.

Table 4 shows the comparison of the pretest and session test for the teacher group and computer group. The results of these t-tests showed a significant difference indicating that the matching skill was learned by children in the teacher group and children in the computer group. The pretest mean percentage score for the teacher group was 46.2% and the session test mean percentage score was 70.9%. The pretest mean percentage score for the computer group was 41.8% and the session test mean percentage score was 62.1%.

Objective 3

To determine if the retention level of the matching skill was significantly greater for children practicing with the teacher or on the computer, a two-tailed t-test for matched pairs was used. Table 2 shows the mean scores for the session test and the post-test for all children. There was no significant difference found.

Table 3 shows the comparison of the teacher group and the computer group on the post-test. There was no significant difference found.

TABLE 3

MEAN SCORES OF TEACHER GROUP AND COMPUTER GROUP ON THE PRETEST, SESSION TEST, AND POST-TEST
(N = 2Ø)

	Mean Score		Standard Deviation		
Tests	Teacher Group	Computer Group	Teacher Group	Computer Group	*t value
Pre-test	5.55	5.ØØ	2.96	2.85	1.36Ø7Ø
Session	5.65	4.95	1.9Ø	2.36	1.83997
Post-test	8.5Ø	8.15	2.91	2.63	.582Ø7

* T value > 2.Ø42 for 38 degrees of freedom is significant at .Ø5 level.

TABLE 4

MEAN PERCENTAGE SCORES OF PRETEST, SESSION TEST, AND POST-TEST ON THE TEACHER GROUP AND COMPUTER GROUP (N = 20)

	Mean % Scores			Standard Deviation			
Group	Pretest	Session test	Post-test	Pretest	Session test	Post-test	*t value
Teacher	46.2		70.9	24.7		24.3	5.62996*
Computer	41.8		68.0	23.7		22.0	4.84806*
Teacher	46.2	70.9		24.7	23.8		6.22490*
Computer	41.8	62.1		23.7	29.4		4.77368*
Teacher		70.9	70.9		23.8	24.3	.01027
Computer		62.1	68.0		29.4	22.0	1.18664

* T value > 2.093 for 19 degrees of freedom is significant at .05 level.

Table 4 shows the comparison of the session test and post-test for the teacher group and the computer group. The results of both of these t-tests showed no significant difference.

Objective 4

To determine if there was a significant difference between boys and girls in learning the matching skill when practicing with the teacher or on the computer, a two-tailed t-test for unmatched pairs was used. Table 5 shows the mean scores of boys and girls on the pretest, session test, and post-test divided by teacher group and computer group. The t-test results on the pretest showed no significant difference between the boys and girls in either the computer group or teacher group. The mean scores of the teacher group were girls, 5.Ø, and boys, 6.1. The mean scores of the computer group were girls, 5.8, and boys, 4.2.

Table 5 indicates that no significant difference in learning occurred between the girls and boys, on the session test, in the teacher group, or in the computer group. The mean scores of the teacher group were girls, 4.8, and boys, 6.5. The mean scores of the computer group were girls, 5.Ø, and boys, 4.9. Comparing the mean scores of the girls and boys in each group (teacher and computer) on the post-test indicates that there was no significant difference in the

TABLE 5

MEAN SCORES OF GIRLS AND BOYS ON THE PRETEST, SESSION TEST, AND POST-TEST

	Mean Scores		Standard Deviation		
Groups	Girls	Boys	Girls	Boys	*t value
PRETEST					
Teacher	5.Ø	6.1	3.13	2.66	1.2773Ø
Computer	5.8	4.2	3.Ø3	2.4Ø	2.Ø248Ø
SESSION TEST					
Teacher	4.8	6.5	1.89	1.5Ø	2.Ø8556
Computer	5.Ø	4.9	2.21	2.49	.13390
POST-TEST					
Teacher	8.4	8.6	2.35	3.37	.15789
Computer	8.6	7.7	2.83	2.33	.74769

* T value > 2.1Ø1 for 18 degrees of freedom is significant at .Ø5 level.

learning retention between the girls and boys in either group.

The use of a two-tailed t-test for matched pairs showed that there was a significant difference between the mean scores on the pretest and post-test of the testing control group (Table 6). Table 7 summarizes the mean scores of the pretest and post-test for the testing control group and the treatment group (teacher group and computer group). For this comparison a two-tailed t-test for unmatched pairs was used due to the difference in group size.

There was no significant difference between the testing control group and the treatment group when comparing the pretest scores. However, the treatment group scored significantly higher on the post-test then the testing control group.

TABLE 6

PRETEST AND POST-TEST MEAN SCORES OF THE CONTROL GROUP

Mean Score		Standard Deviation		
Pretest	Post-test	Pretest	Post-test	*t value
5.Ø7	7.13	3.2Ø	3.84	3.41113*

* T value > 2.145 for 14 degrees of freedom is significant at .Ø5 level.

TABLE 7

MEAN SCORES OF THE CONTROL GROUP AND TREATMENT GROUP

	Mean Scores		
Test	Control	Treatment	*t value
Pretest	5.Ø7	5.275	.62690
Post-test	7.13	8.325	2.557ØØ*

* T value > 2.Ø21 for 53 degrees of freedom is significant at .Ø5 level.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

I. SUMMARY

With the popularity and usefulness of the microcomputer, some companies are encouraging schools to buy their microcomputer system and allow the students in every classroom to take advantage of the newest advancements in educating children. To compliment the microcomputer in the classroom, there are packaged programs now available for almost any subject area from the college level down to the elementary school level.

This study was designed to address the following questions: Will placing microcomputers in the preschool classroom be beneficial to the preschoolers in their learning process? Can the computer provide the kind of individual feedback that a preschooler needs?

The teacher found most of the children very eager to participate in all phases of the study. When first encountering the pretest, many of the children were unsure how to mark the apple and watched another child sitting at the table. On a few occasions, the teacher took a child's hand and helped him/her make the first mark. Once they marked the first page, they were no longer hesitant about marking the remaining pages. This hesitancy may have occurred because this was a different type of activity from

those to which most of the children were accustomed. The way the children marked their booklet was one of four approaches: outlining the symbol, scribbling over the symbol, placing a dot or line on the symbol, or circling the symbol.

During the teaching portion of the study, the children had little difficulty with the two block matching exercises. This can be attributed to the block characteristics since they were different colors as well as different shapes.

Several observations were made by the researcher during the practicing session. In both the teacher group and the computer group, the younger children's attention was distracted easily and they had a difficult time carrying out the task. This difficulty may have been the result of the large quantity of symbols before the child at one time, the size of the symbols and perhaps the subject matter. Numbers and letters may have been too advanced for their age. Most children in both groups continually appeared to confuse 6 and 9.

Children in the teacher group had more difficulty with the letters than the numbers. It was observed that if the child held the number card or scrabble chip, he/she more readily matched the symbol.

Children in the computer group were very curious about the computer and were eager to work on it. The intention

was that the children in the computer group would work at the computer with little or no interaction with the teacher. This approach did not work. It was necessary for the teacher to give just as much encouragement to the computer child as had been given to the teacher child, even though the happy face was an immediate reward.

Several factors may have been responsible for this needed encouragement. The computer was a new and different media for the child to be working with. Because the operations of the computer were so different, the child may not have fully understood that the computer would prompt with another symbol. The child may have needed a verbal reward because he/she was accustomed to such rewards.

The researcher observed that the children in the computer group did not do as well on successfully matching the symbols as the children in the teacher group, lost interest in practicing before the seven minutes were up, and appeared under stress. It appeared that the child having difficulty matching the symbol had too many symbols to choose from on the keyboard. There also was a distance between the symbol on the screen and the keyboard. The researcher observed that when the child was unable to find the correct symbol in three to five tries, he/she became uneasy and asked for help in finding the match.

As table 3 (p. 36) indicated there was no significant

difference in learning that took place between the teacher group and the computer group on the session test or the post-test. Table 4 (p. 37) showed that the children in the teacher group and in the computer group significantly improved when comparing the pretest and session test scores. This indicates that the matching skill was learned. There was no significant difference when comparing the session test and post-test scores in the teacher group and in the computer group. This indicates that the matching skill was retained since the post-test was given with a one-day lapse between the session test and post-test.

There was a different composition in the testing control group, twelve boys and three girls, than in the treatment groups, equal number of boys and girls. However, this difference did not effect the following results.

Children in the testing control group who had no treatment but just took the pretest and post-test showed a significant improvement in scores (Table 6). These results indicated that the test instrument caused learning to take place.

Table 7 showed a significant difference between the post-test scores of the treatment group and the testing control group. These results indicate that, although the testing control group learned by just taking the test, the children who received treatment (teacher group and computer

group) learned significantly more than the testing control group.

II. CONCLUSIONS

The portion of this study dealing with the literature search and the pretest/post-test and session test revealed the following conclusions:

1. Title XX preschool children will learn a skill equally as well when taught by a teacher or on a computer.

2. Children need exposure to the computer before they will comfortably work at it alone without verbal reinforcement.

3. Three-year-olds have not developed the visual-tactile (eye-hand coordination) skill to successfully complete a drill and practice program like the one presented in the study.

4. The retention level for a preschooler is about the same when practicing with a teacher as when practicing on a computer.

III. RECOMMENDATIONS

Further studies with preschoolers who have had exposure to a microcomputer could be very useful since this study exposed children for the first time to the computer. In this study the teacher gave the computer children verbal encouragement to continue with the next matching problem

that was displayed on the screen. Future studies might use a voice synthesizer to give the verbal encouragement that preschoolers need. Future studies using computers with young children might limit the number of symbols for the child to select from and increase the size of the symbols to avoid problems that occurred for most of the children in this study.

This study dealt with a drill and practice approach. It would be useful to have studies on the learning retention of children using the program language LOGO in a preschool setting.

LIST OF REFERENCES

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Dinkmeyer, Don. and Jon Carlson. "Kids and Computers." Elementary School Guidance Counseling. Oct. 1983. pp. 3-4

Geisert, Gene. "Byte Size." Early Years. Nov. 1983. p. 8

Geisert, Gene. "How to Help Teachers Welcome Computers." The American School Board Journal. Mar. 1982. p. 29

Geisert, Gene. and Eileen Seegull. "Today's Computers - At Your Service." Early Years. April 1982. pp. 35-36

Geoffrion, Leo. and E. Paul Goldenberg. "Computer-Based Exploratory Learning Systems for Communication - Handicapped Children." Journal of Special Education. Fall 1981. pp. 325-332

Getman, G. N. "Computers in the Classroom: Bane or Boon?" Academic Therapy. May 1983. pp. 517-524

Hirshberg, Peter. "A Museum that Develops Computer Literacy." Education Digest. Jan. 1982. pp. 54-56

Joiner, Lee M. and Sidney Miller. and Burton Silverstein. "Potential and Limits of Computers in Schools." Educational Leadership. Mar. 1980. pp. 498-501

Kastler, Lesa. and Nancy Roser. "The Computer vs. Real Reading Instruction." Early Years. Oct. 1982. pp. 20-21

Lazarus, Mitchell. "So Complicated, They're Simple: A Reassuring Word on Classroom Computers." Principal. Nov. 1982. pp. 39-41

Leimbach, Judy. "Spotlight on Computers: Students in Control." School Library Journal. Aug. 1982. p. 37

Malone, Thomas. "Guidelines for Designing Educational Computer Programs." Childhood Education. March/April 1983. pp. 241-246

Martellaro, Helena. "What's Keeping Computers Out of the Classroom?." Education Digest. Jan. 1981. pp. 27-29

Mason, George. "Computerized Reading Instruction: A Review." Educational Technology. Oct. 1980. pp. 18-22

McDonald, Glenda. and William Holloway. "Computer Awareness: Teaching Different Age Groups." NASSP Bulletin. Sep. 1982. pp. 92-98

Nolen, Patricia. "Sound Reasoning in Spelling." The Reading Teacher. Feb. 1980. pp. 538-43

Papert, Seymour. Mindstorms, Children, Computers and Powerful Ideas. New York: Basic Books, Inc. Publishers, 1980

Papert, Seymour. and Cecil Green. and Ida Green. "And a Little Child Shall Lead Them." Instructional Innovator. Feb. 1982. p. 19

Roscoe, John. Fundamental Research Statistics for the Behavioral Sciences. New York: Holt, Rinehart and Winston, Inc., 1969

Sears, Pauline. and David Feldman. "Changes in Young Children's Classroom Behavior After a Year of Computer-Assisted Instruction: An Exploratory Study." Stanford: Stanford Center for Research and Development in Teaching, 1968

Spencer, Mima. and Linda Baskin. "Computers in the Classroom." Childhood Education. March/April 1983. pp. 293-296

Streibel, Michael. "The Educational Utility of LOGO." School Science and Mathematics. Oct. 1983. pp. 474-484

Tursman, Cindy. "Powerful Ideas." Educational Leadership. Nov. 1982. pp. 68-70

Von Stein, Jan. "The Computer - A Learning Friend." Early Years. May 1983. pp. 12-13

Weyer, Stephen. "Computers for Communication." Childhood Education. March/April 1983. pp. 232-236

Zeiser, Edward. and Stevie Hoffman. "Computers: Tools for Thinking." Childhood Education. March/April 1983. p. 251

APPENDIXES

APPENDIX A

PARENT LETTER AND LETTER EXPLAINING THE STUDY

PARENT LETTER

Dear Parent,

Your child has been selected to participate in a study conducted by a teacher who is in graduate studies at UT.

This study will consist of the teacher teaching a seven minute lesson relating to numbers and letters similar to the kinds of activities your child is exposed to at the center. Two methods, one using a computer and the other with a teacher, will be taught. Your child will be placed in one of these groups.

An evaluation will be given at the conclusion of the lesson to determine if the lesson concept was understood by your child. The results of this evaluation will be used only to determine how rapidly each group of children learned. No individual children will be named.

Please fill in the form below and return it to the center by March 9th.

- -

I give permission for my child, _____ to participate in this study conducted by a teacher who is a graduate student at UT. I understand that my child's name or scores will not be used individually in the final report.

You will be free to withdraw your child from this study at any time and your decision will not affect your services in any way with the day care center.

The results of this study may help teachers in the future to be more effective in their teaching.

_____ _____

Date Parent's signature

Contact person- Bonnie Comfort 521-8707

LETTER EXPLAINING THE STUDY

March 1, 1984

Dr. Aaron Means
Board of Education

Dear Dr. Means:

I am a graduate student at U. T. working toward my Masters Degree and would like permission to work with the three and four year old children enrolled in the Knox Nursery School Program.

The enclosed permission letter explains the involvement I would be having with the children toward completing my thesis.

I would be grateful for your consideration in assisting my thesis project.

Sincerely,

Bonnie Comfort

Bonnie Comfort

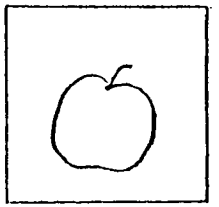
APPENDIX B

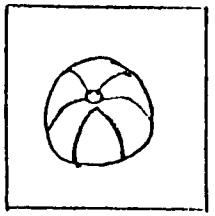
PRETEST/POST-TEST AND SESSION TEST

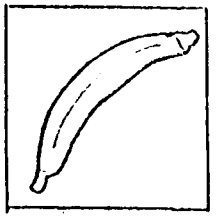
PRETEST/POST-TEST

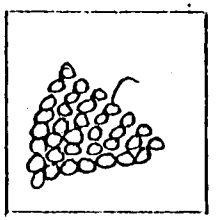
NAME_____ DATE_____ ( ) Pretest ( ) Post-test

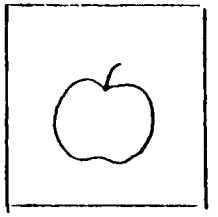
BIRTHDATE_____

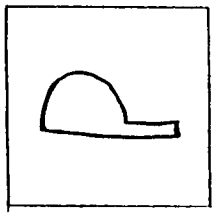


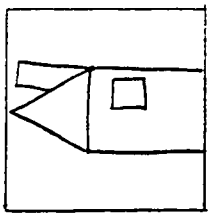


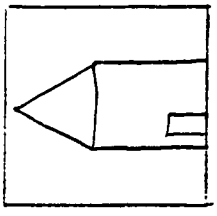


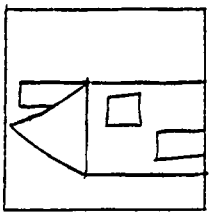


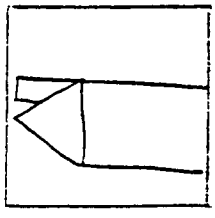


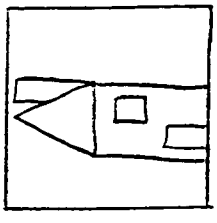


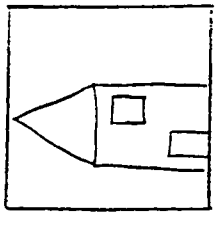


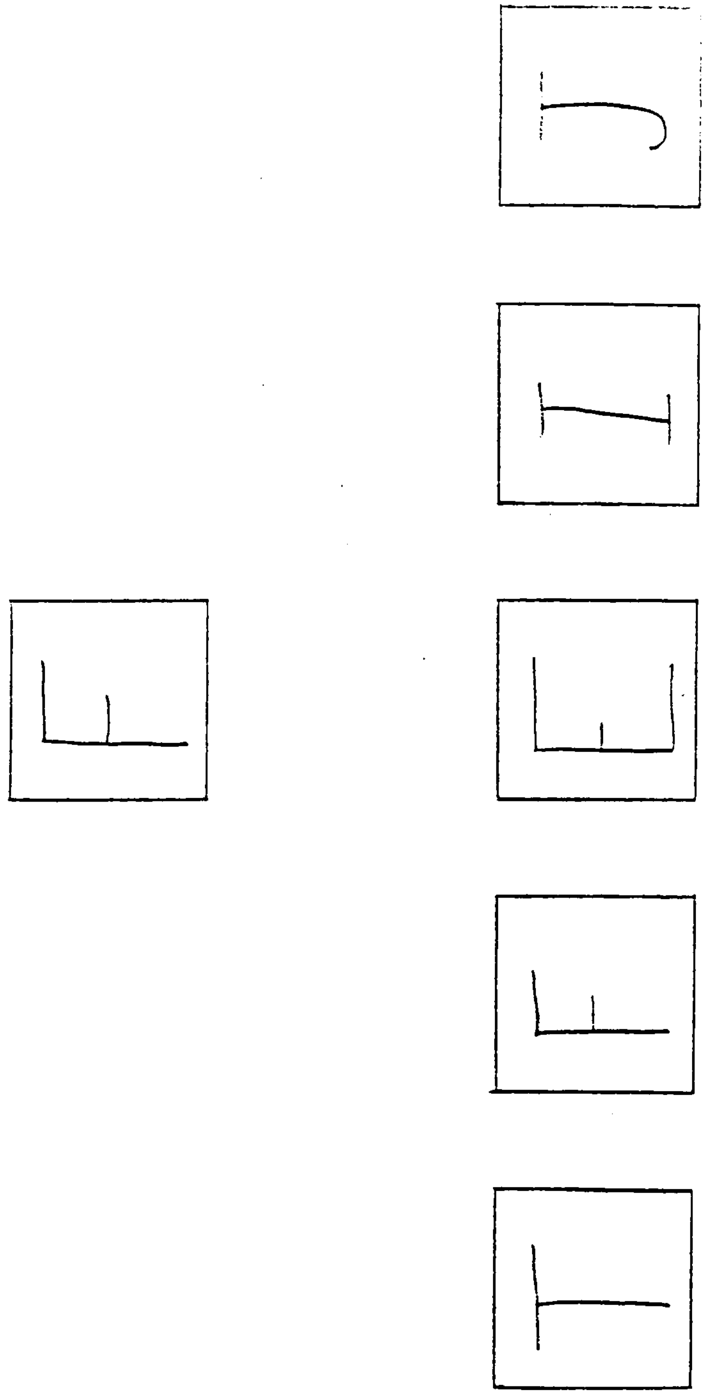


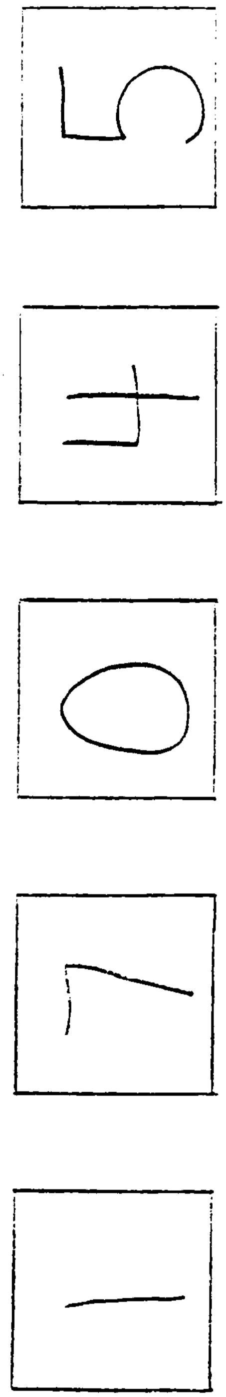


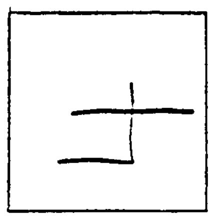


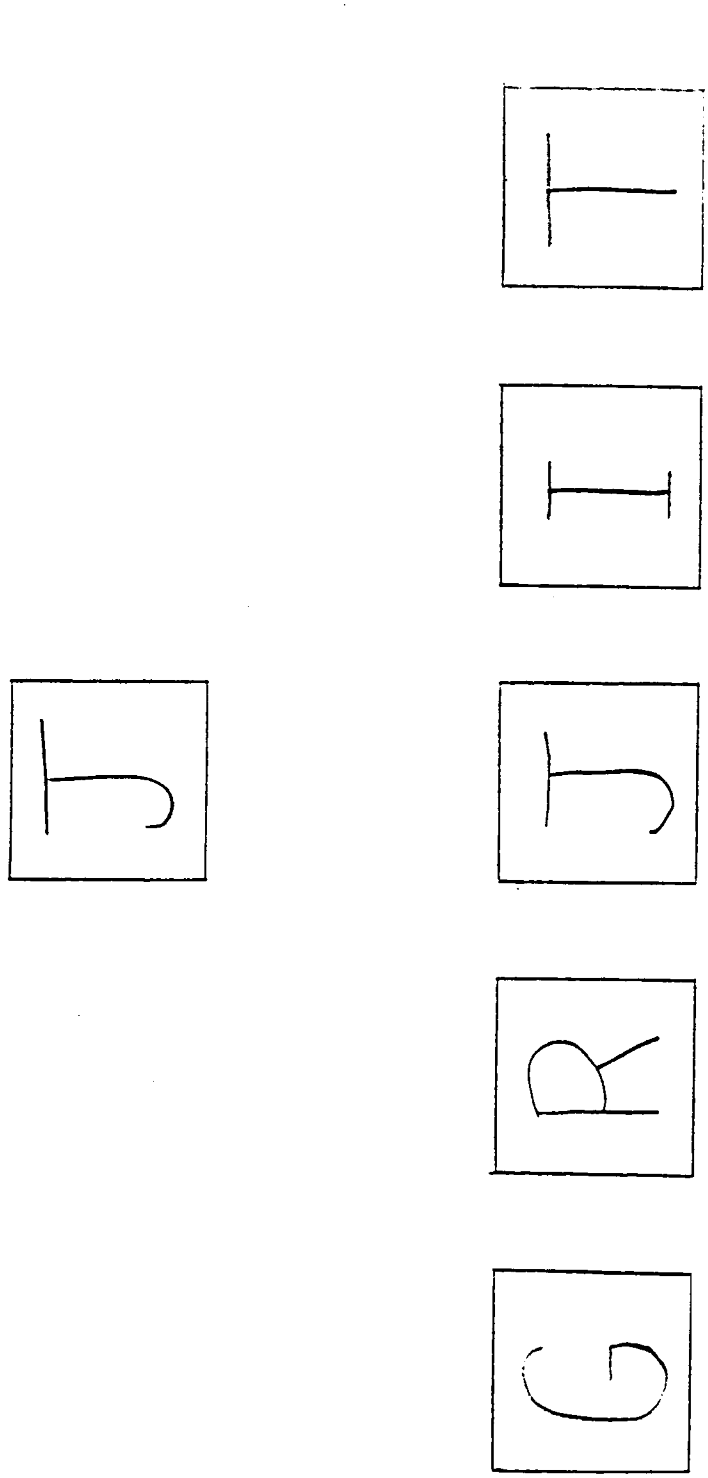


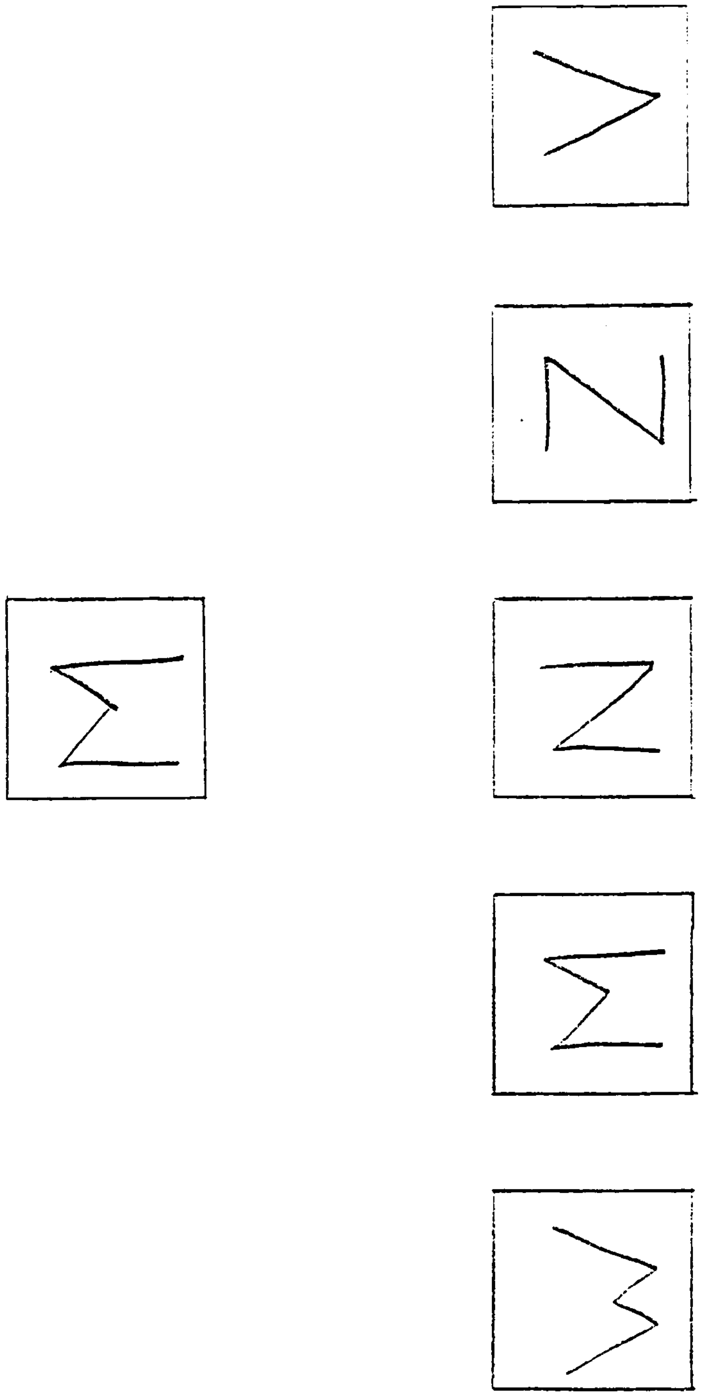


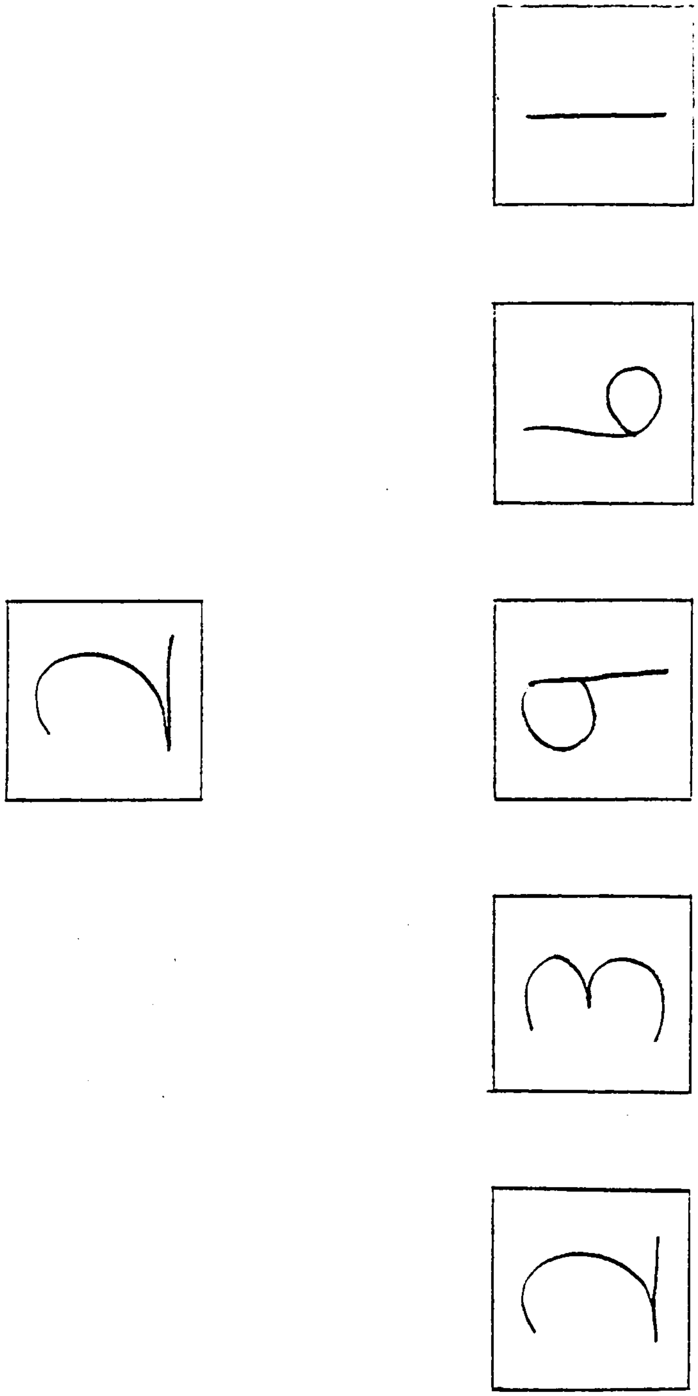


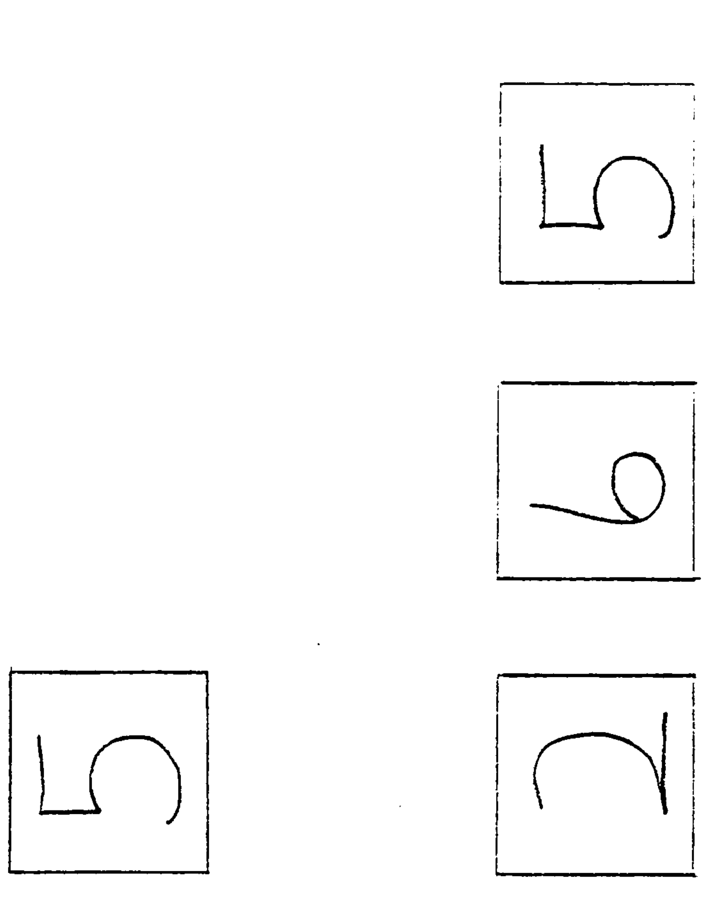


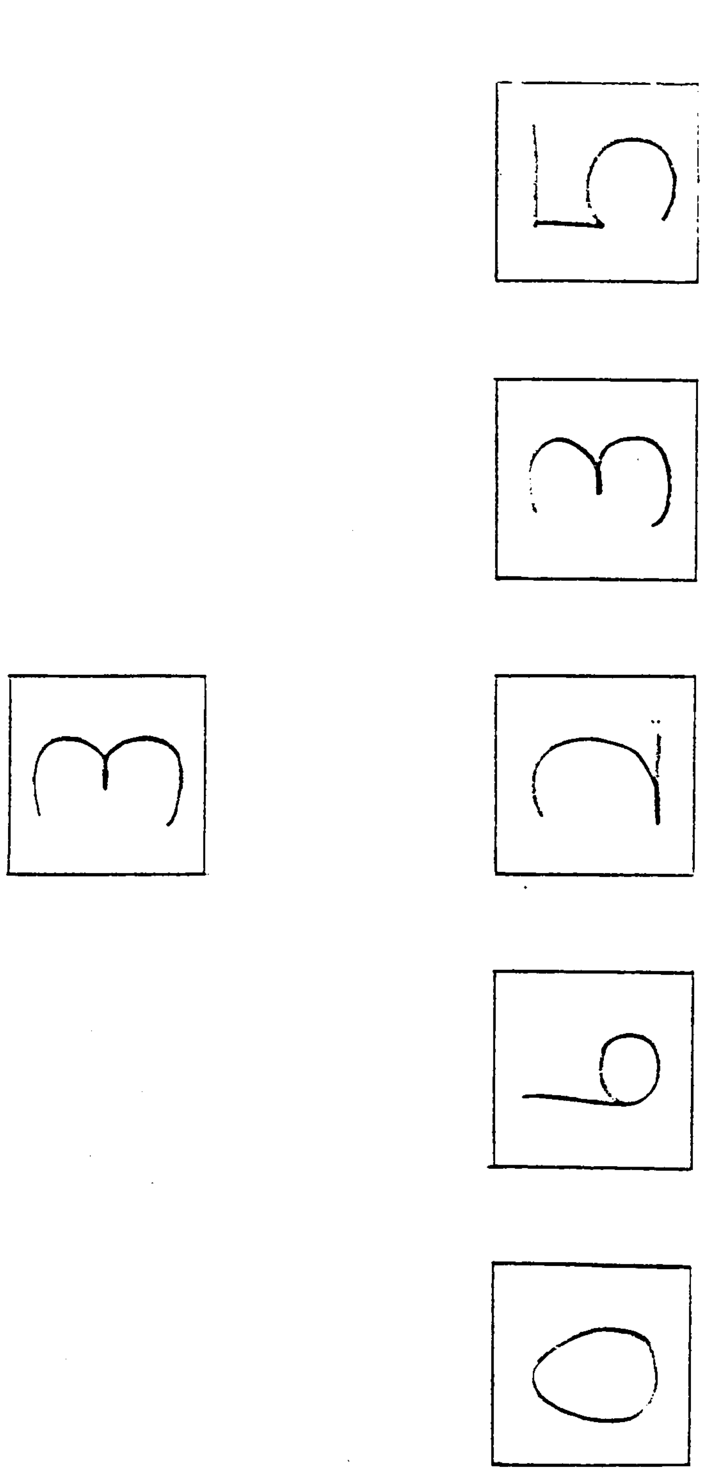


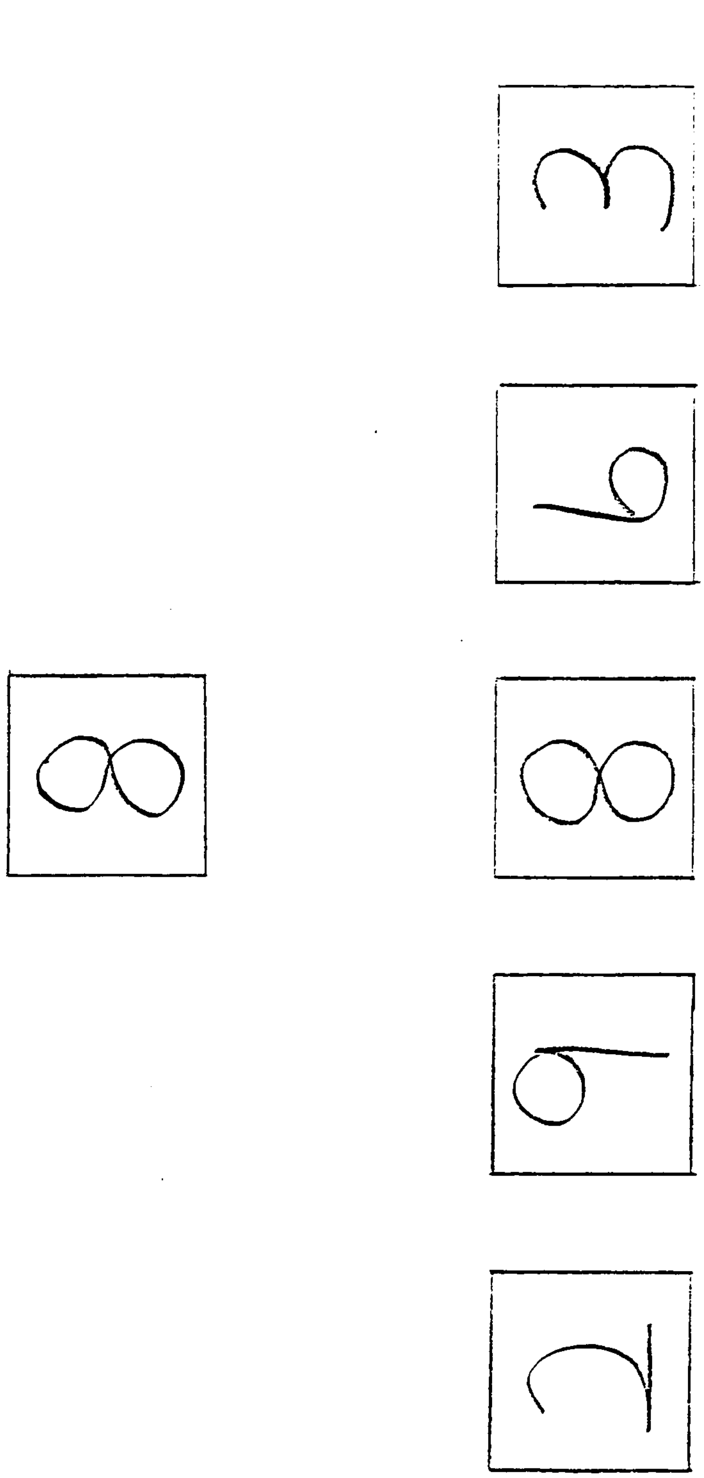


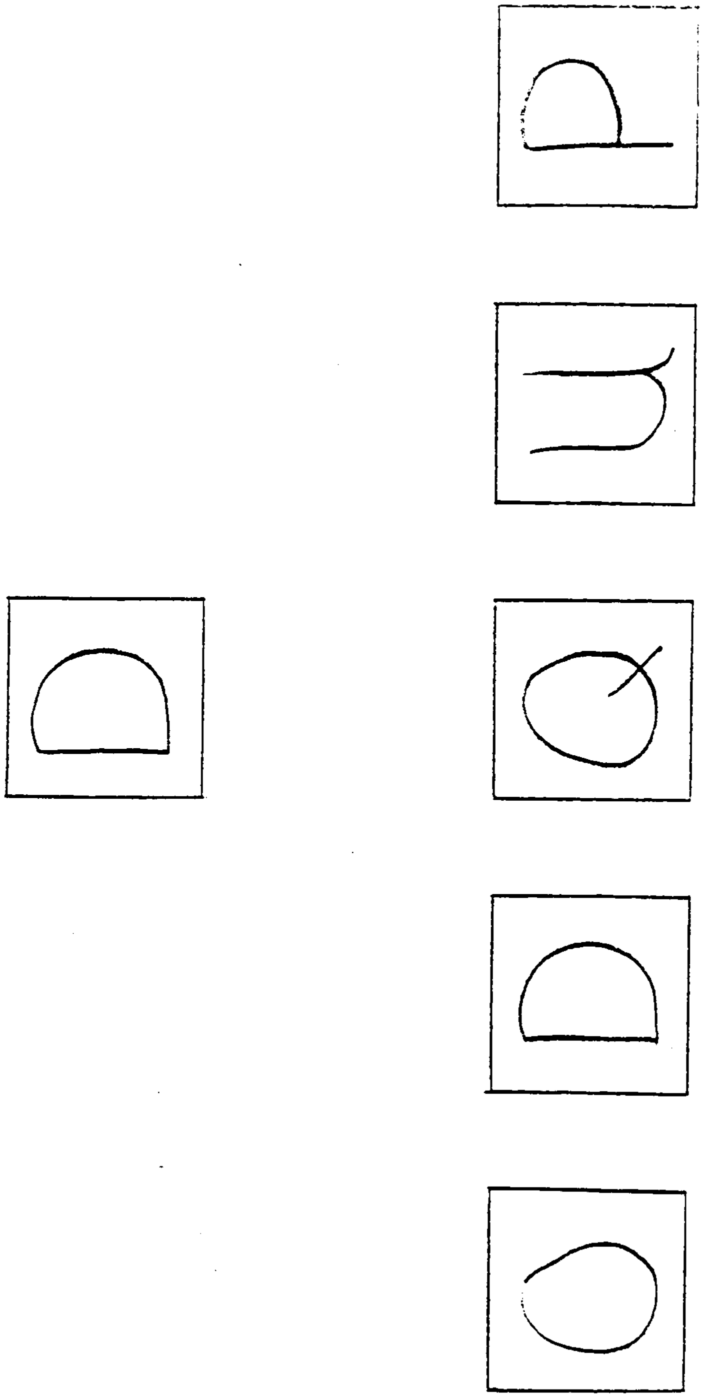


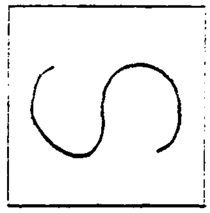


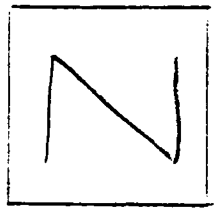


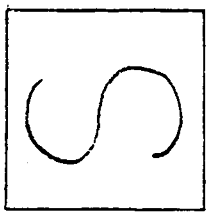


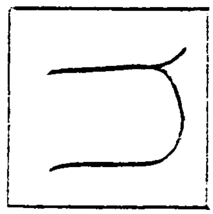


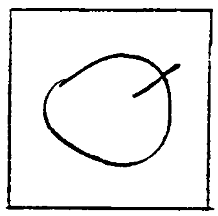


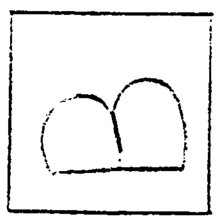


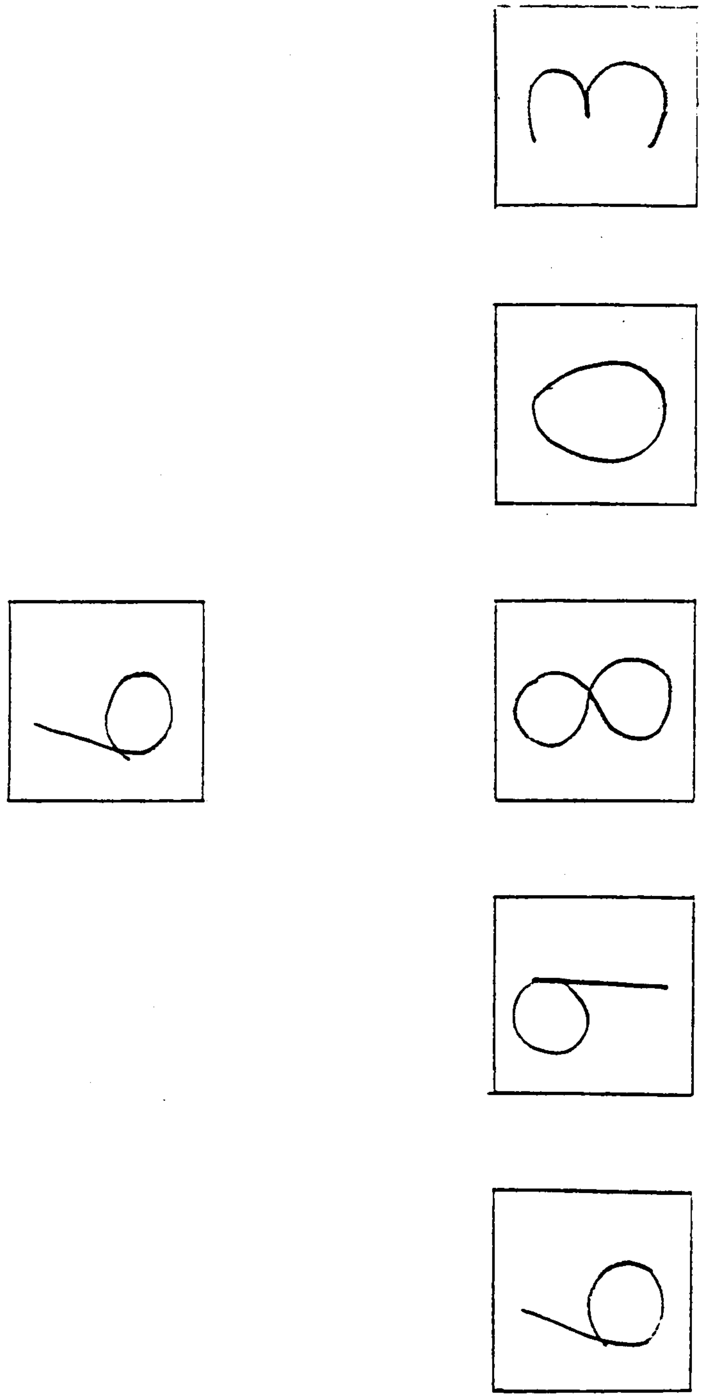


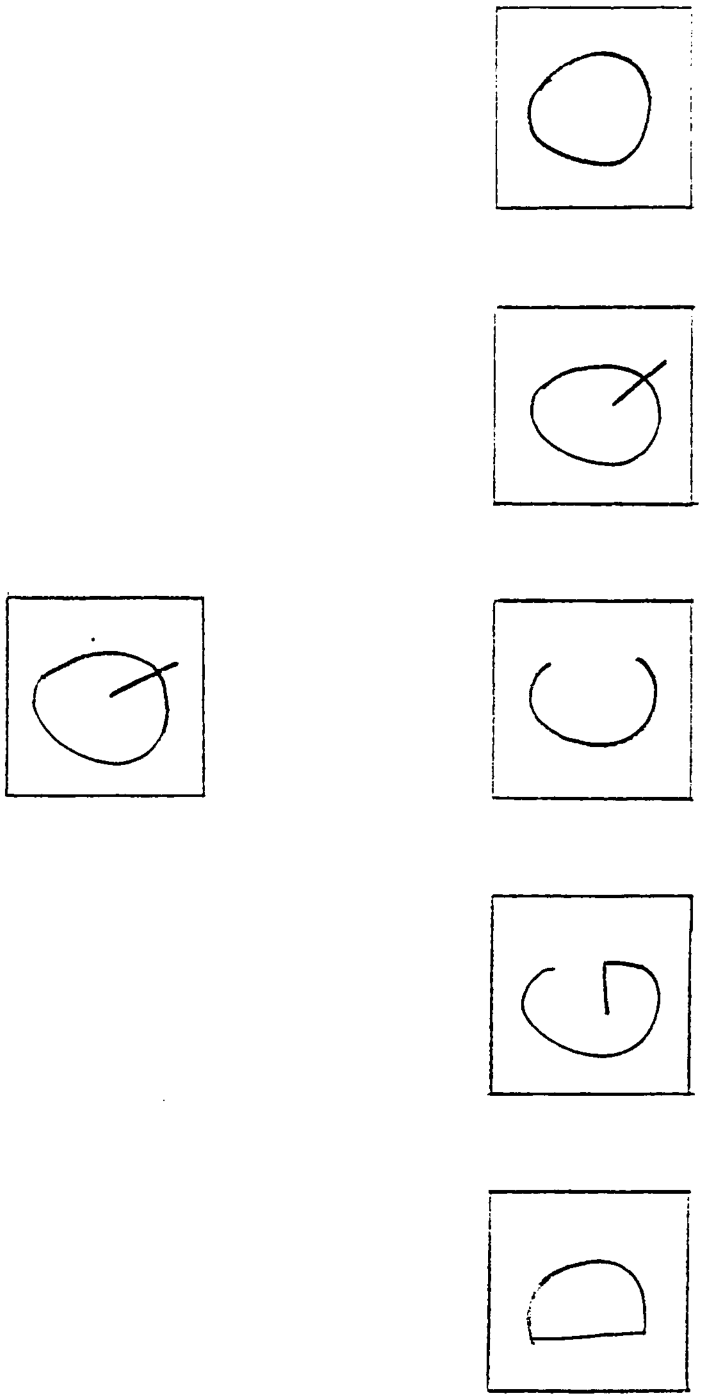












SESSION TEST

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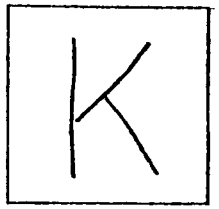

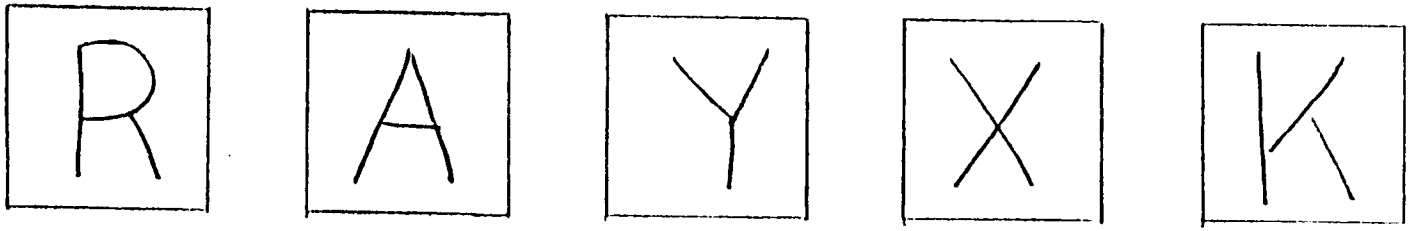

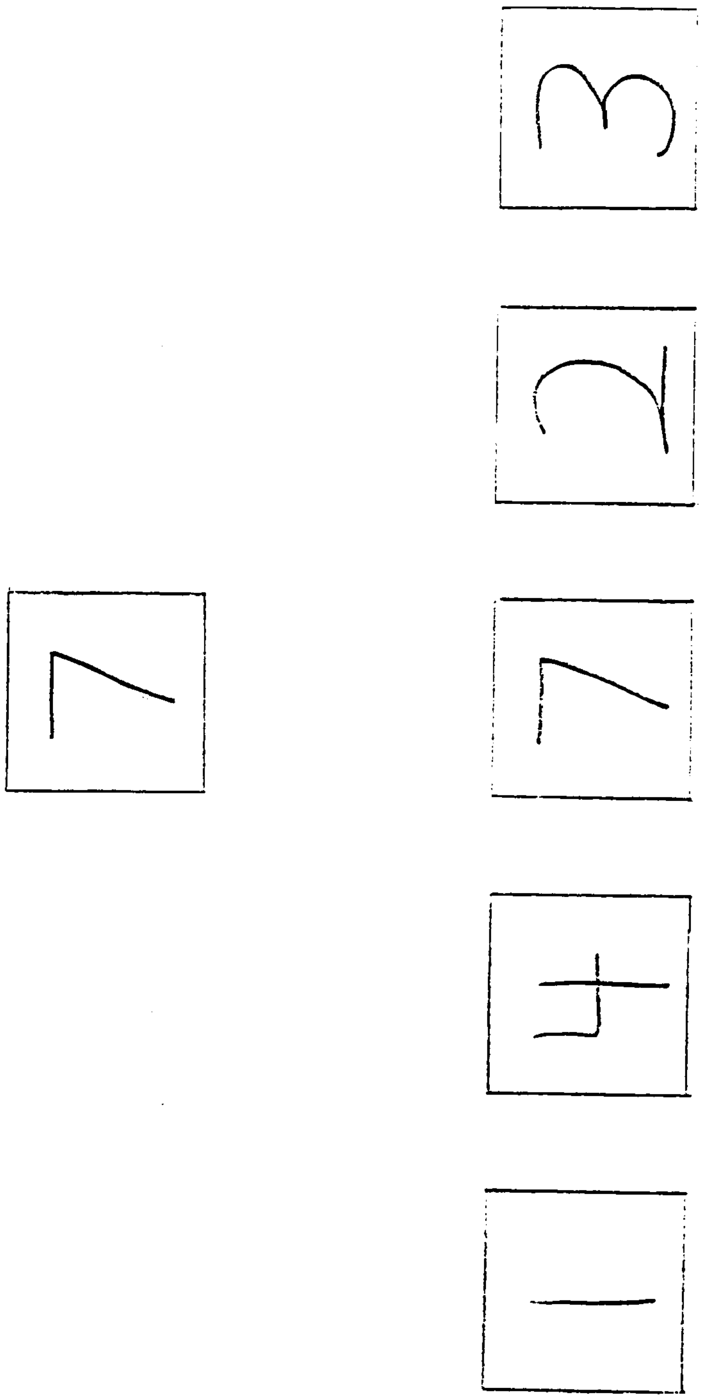

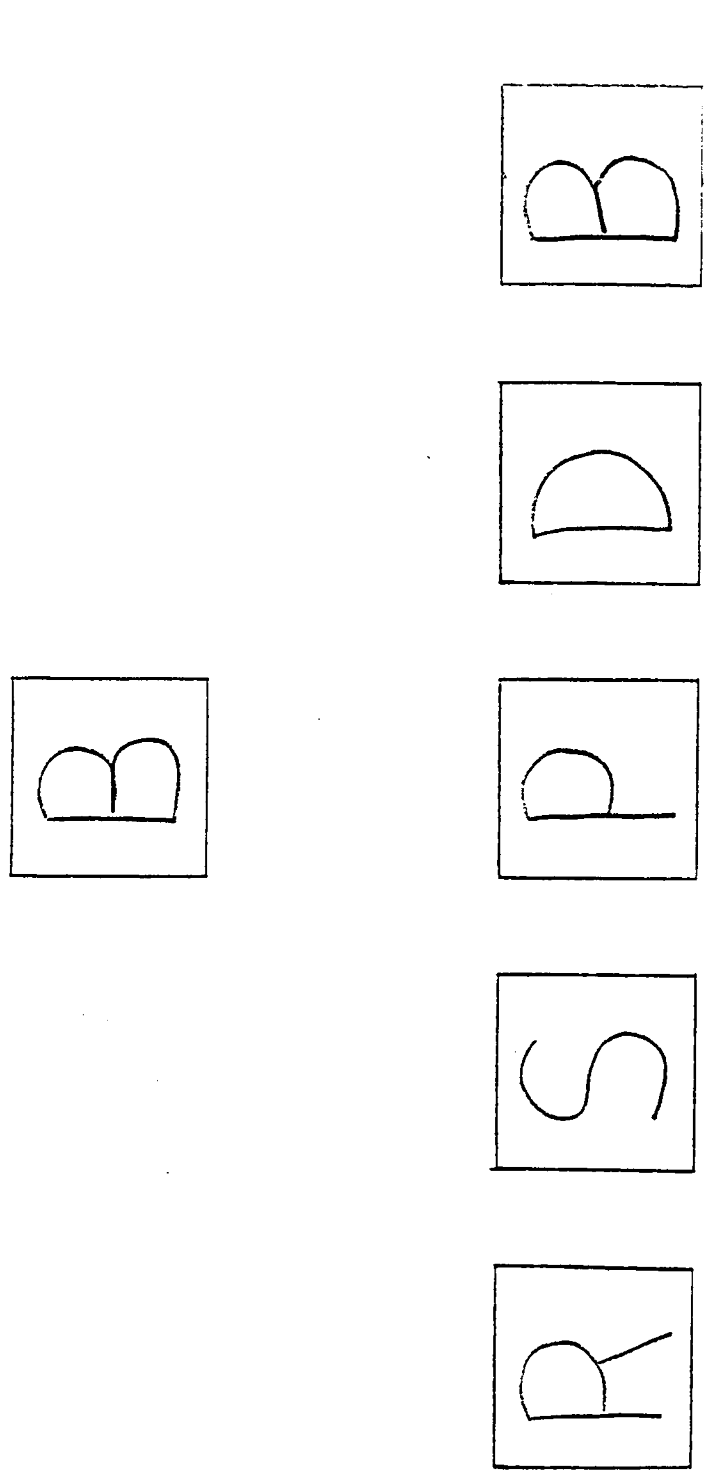

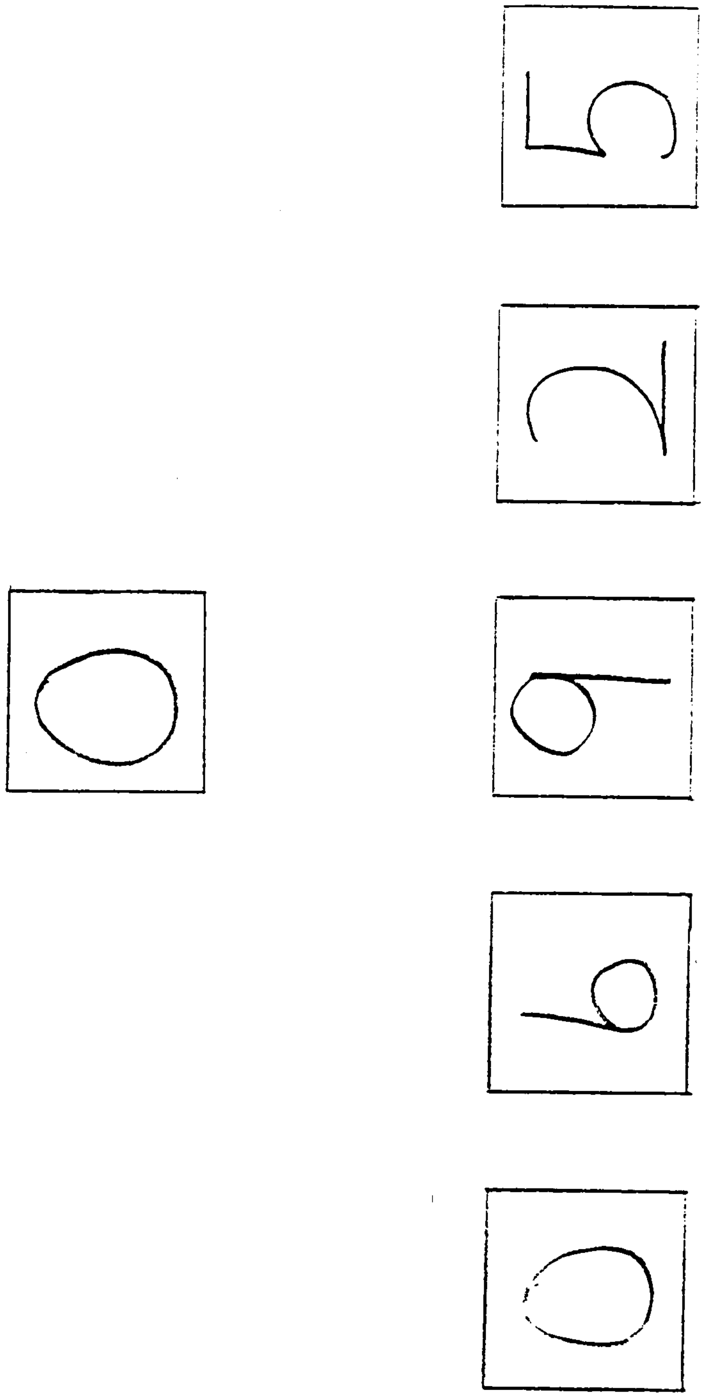

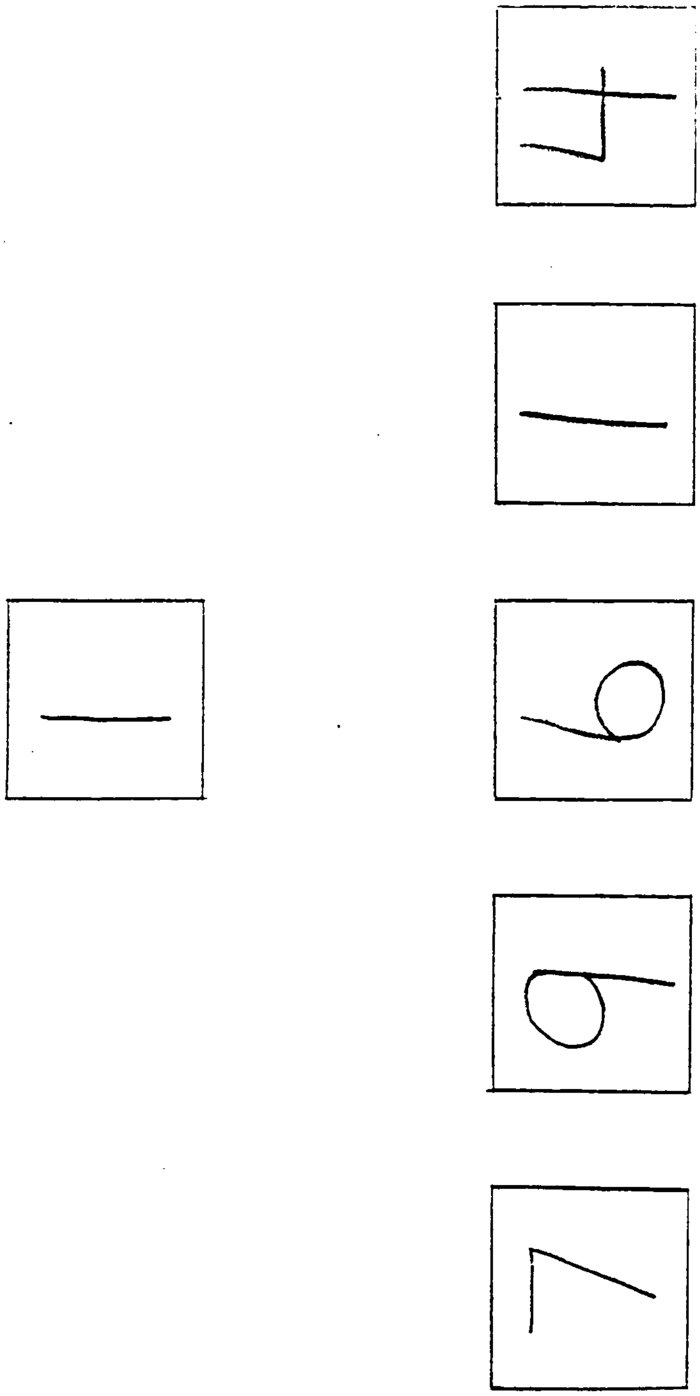

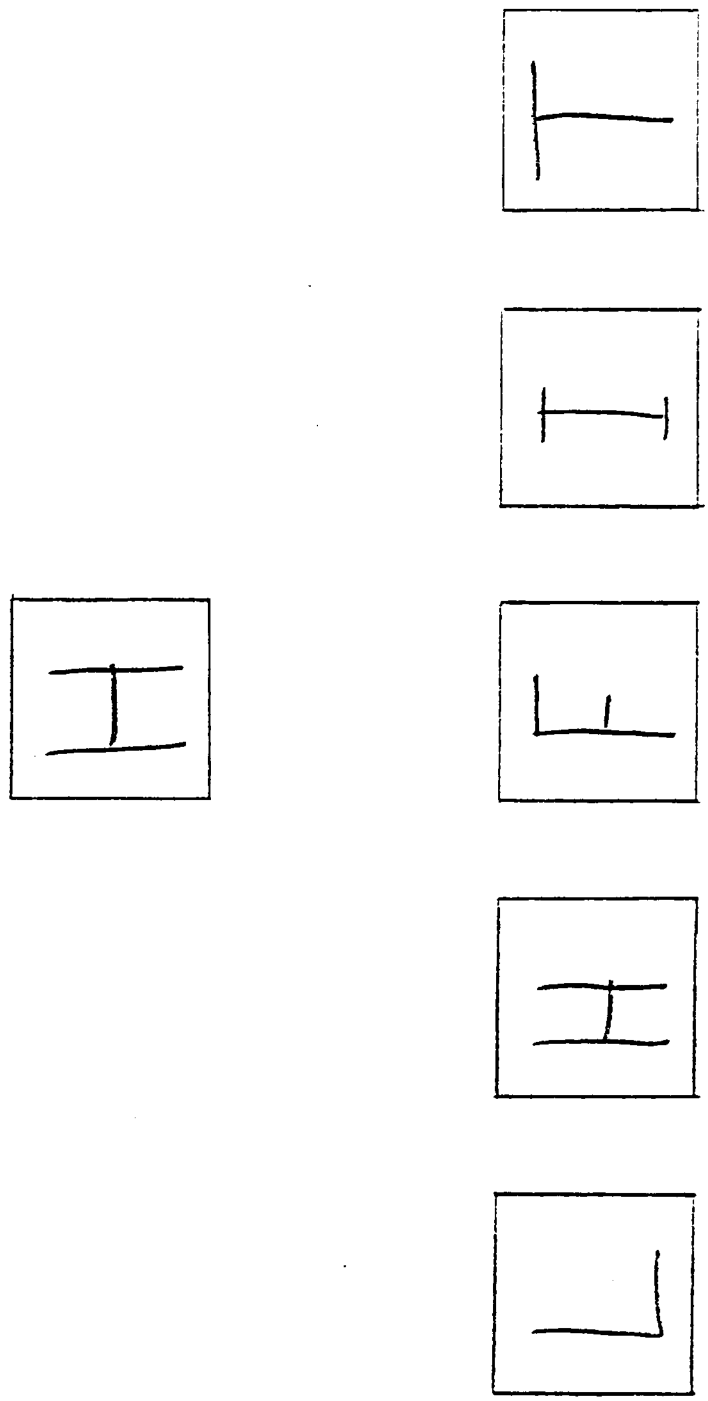

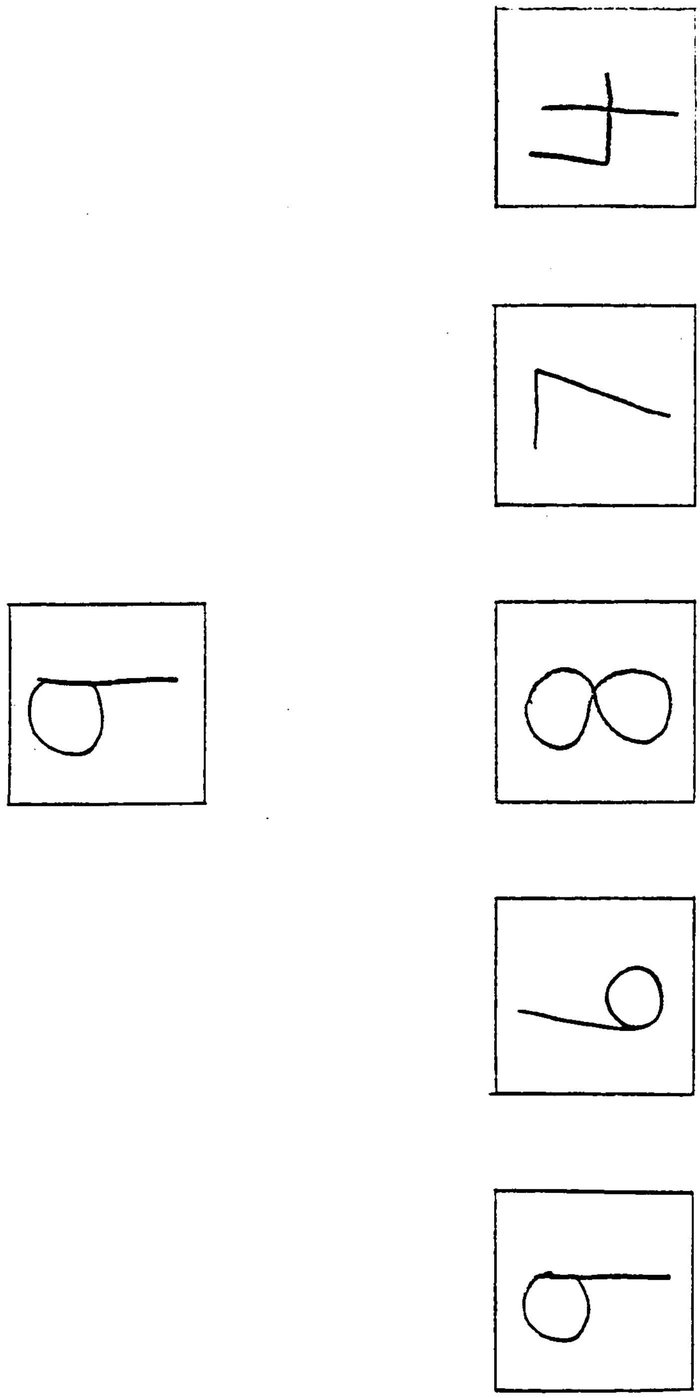

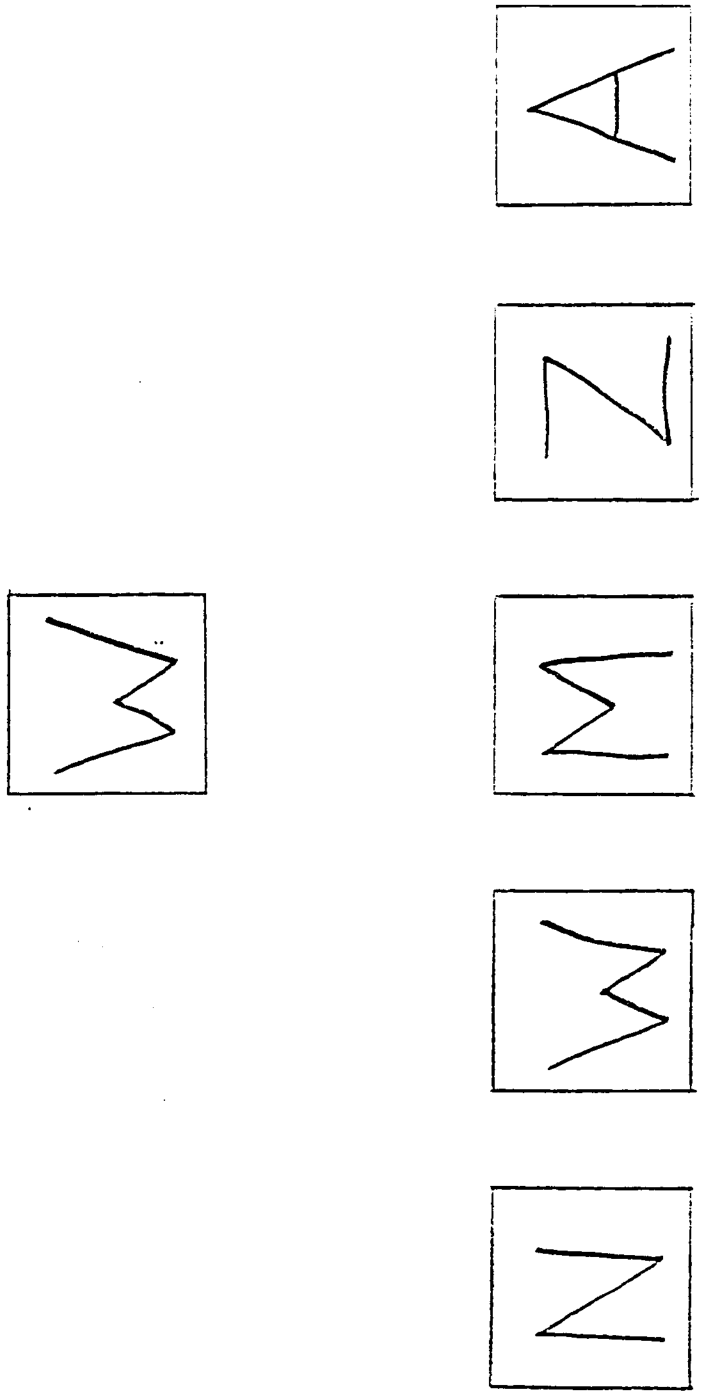

VITA

Bonnie Louise Comfort was born in Goshen, New York, on December 4, 1947. She attended elementary school in Walden, New York, and was graduated from Valley Central High School in 1966. In September of that year she entered Central College in Pella, Iowa. In June 197Ø she received a Bachelor of Arts degree in Elementary Education.

In July 197Ø she was accepted into the Adventure In Mission program and was assigned to the Greenville Reformed Church in Jersey City, New Jersey. In September 1971 she opened the Kiddee Korner Day Care Center in Jersey City, New Jersey. She was the director and head teacher until 1973.

In May 1973 she moved to Knoxville, Tennessee. From September 1973 until January 1974 she worked as a nurse's aid at National Health Enterprises nursing home in Knoxville, Tennessee. She accepted a teaching position in the child care program at Knoxville's Community Development Corporation in February 1974. She continued to teach and supervise until August 198Ø. At that time she became director of the child care program and holds that position today.

She is unmarried and lives in Seymour, Tennessee.