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An Investigation of the Visual Selective Attention Abilities of Children Completing a Kindergarten Program

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AN INVESTIGATION OF THE VISUAL SELECTIVE ATTENTION
ABILITIES OF CHILDREN COMPLETING
A KINDERGARTEN PROGRAM

THESIS

Submitted to the Graduate Committee of the
Department of Curriculum and Instruction
Faculty of Education
State University College at Brockport
in Partial Fulfillment of the
Requirements for the Degree of
Master of Science in Education

by

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Abstract

This study investigated the ability of children completing a kindergarten program to perform a visual selective attention task.

It also examined the data to determine if measurement of the task in the visual area would complement significantly a traditional reading readiness assessment.

Subjects were instructed to sort 25 stimulus cards according to the central feature, the Greek letter. They were told to ignore the incidental features of card shape, card background color and color of the Greek letter. The subjects were given a central score for the cards correctly grouped. After completing the task, the subjects were asked to recall the card shapes and card background colors to see if any incidental learning had taken place. Correct answers yielded an incidental score.

The results demonstrate that central and incidental learning have an inverse relationship to each other. The results also indicate that children completing a kindergarten program can successfully perform a visual selective attention task with a high degree of accuracy.

Longitudinal evidence is necessary before it can

be determined if measurement of this task would complement significantly a traditional reading readiness assessment. The use of a visual selective attention task may be a useful additional screening procedure, especially where traditional measures are inconclusive.

Acknowledgments

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Chapter 1

Statement of the Problem

Although visual selective attention is one of the basic prerequisites for beginning reading, the topic is often neglected. It is rare for a textbook in reading instruction to contain any reference to this topic. Yet it has been shown that visual selective attention is a developmental skill and that some reading problems may be directly related to a retardation in this area (Ross, 1976).

Since selective attention is vital to the reading task, one can assume that children who are ~~unable~~ to selectively attend to visual distinctive features will be ready for reading earlier than those students who cannot (Samuels, 1971).

A child must be able to selectively attend to the relevant stimuli of the task before the reading process can begin. It is an ability that is necessary throughout reading acquisition, but it is most important during the beginning stages of instruction (Turnure, 1972). Therefore, it would be logical to assume that those children deficient in selective attention could experience difficulties at beginning reading tasks.

By investigating children's ability to selectively attend to a central feature of a visual stimulus, it is hoped that an additional screening procedure for beginning readers might be provided. It is assumed that those children who are able to perform successfully on this task will be more ready for reading than those children who cannot perform successfully.

Purpose

The purpose of this study is to investigate the ability of beginning readers to perform a visual selective attention task.

A second purpose is to examine if measurement of this task in the visual area would complement significantly a traditional reading readiness assessment.

Need for the Study

Studies have shown that children are often bombarded with visual stimuli from several different sources. Children must learn to choose the stimuli to which they will attend and to ignore others. Massive confusion would result if one were not able to selectively attend to incoming stimuli (Craighead, Kazdin, Mahoney, 1976).

The stimuli to which a child chooses to attend

can include the color of the blackboard, a bee flying around the classroom, or the teacher's pointing finger. Some of the chosen stimuli may be appropriate to the learning situation and others may not.

The ability to selectively attend has crucial importance to reading. There are many important, appropriate stimuli to which one attends (central features). Additional unimportant and inappropriate stimuli are present (incidental features). Some central features to the reading task are letter combinations and spacing, while some incidental features are letter color, size, or brightness.

The need for this study is to determine if the task of visual selective attention, through the use of component selection, does affect success or failure in beginning reading. Although this study will not include longitudinal evidence supporting this concept, it will lay the foundation for further research in the area of visual selective attention. This study is a primary investigation of the ability of kindergarten children to complete the task of visual selective attention.

Definitions

Incidental learning The subject is given a central task to which she should attend. Any learning that arises from this task produces a central score. If learning arises from the tasks which the subject is instructed to ignore, then the learning is incidental to the central task. Since selective attention is diverted from the central task to acquire the incidental information, selective attention is not completely efficient. The more incidental learning that takes place results from less appropriate functioning of selective attention. They stand in an inverse relationship to each other (Ross, 1976).

Component selection task Given a stack of cards containing varying stimuli (shape, color, symbols) the subject is instructed to group the cards according to the relevant stimuli selected by the experimenter (the symbols) and to ignore the extraneous stimuli.

Selective attention Selective attention is a developmental process. As a child matures, her attentional abilities develop from fixed focus on edges and corners and small parts of stimuli. Children may also be stimulus bound to such features as shape and color (Bee, 1975). This earliest stage, overexclusive

attention, is the most underdeveloped level. There is little or no incidental learning at this stage.

The next stage, overinclusive attention, becomes more voluntary. Color and shape cues play less of a role. Incidental learning is at its highest point and a child learns as much about incidental features as she does about central ones. Again, attention is not completely efficient.

In the most advanced level, the selective attention stage, incidental learning declines and individuals can voluntarily focus on the relevant features of a task (Ross, 1976).

In the reading task, for example, there are many cues that must be ignored by the child, such as color, size, or brightness of letters. It is the relevant aspects such as letter combinations and spacing to which the child must attend. A child in the overexclusive stage may focus on the roundness of the letter 'b' instead of the entire shape of the letter. A child in the overinclusive stage may focus on the number of the page, the margins, and other irrelevant cues.

It is not until the selective attention stage that the letters in relationship to each other, as well as

all aspects of the shapes of the letters can and will be focused on. The reading task is, at this stage, facilitated by this ability.

Limitations of the Study

This study will include 50 students completing a kindergarten program in a local suburban school. Results could vary with a larger population or with subjects from areas other than the suburbs. The study is limited to selective attention in the visual area.

Summary

This study will be an investigation of the ability of children completing a kindergarten program to perform a visual selective attention task using component selection. The results will be examined and possible recommendations for beginning reading placement will be made. It is an assumption that those children deficient in selective attention, as shown by the task, could experience difficulties at beginning reading tasks. In other words, it is believed that those students who are able to perform successfully on the tasks will be more ready for beginning reading than those subjects who cannot perform the identical task.

Chapter 2

Review of the Literature

Introduction

There are many problems in the study of selective attention. The first problem is that of semantic confusion. When one mentions the word "attention" people immediately think of the behaviors related to attention; for example, the behavior of paying attention. Attention is not a behavior, it is a cognitive process. Attention is more than receiving stimuli. It involves what one does with the stimuli to which one is exposed.

At any given time, a person's environment is filled with stimuli or potential stimuli. Since a person is surrounded by stimuli for every sense receptor, a person must develop the ability to select among the stimuli and to attend to one, or a limited number of, stimuli at one time. This is what is meant as selective attention.

A second problem in dealing with selective attention is that of measurement. Selective attention, like learning, can only be measured by inferring a change in performance. If both are measured by a change in performance, would a lack of change be due to an attention problem, a learning problem, or a combination of the two?

Learning cannot take place without selective attention (Ross, 1976). Before learning can take place, the child must have developed the capacity to use selective attention. If selective attention is not functioning properly, the child will have trouble learning (Ross, 1976). This ability is crucial for reading. A child must be able to selectively attend to the relevant stimuli of the task before the reading process can begin.

Ross has identified five different methods for studying this area: signal detection, dichotic listening, incidental learning, component selection, and heart rate changes. Of the five methods identified, the two most applicable to the beginning reading classroom are component selection and incidental learning.

Related Research

Research shows that selective attention improves with age up to early adolescence (Ross, 1976). Children with learning problems show performances which are similar to younger normal children. Since it is a developing ability, children vary in their developmental level at any given age. Children also vary in the quality of their ability.

Ross suggests that as a child matures there are

certain stages of selective attention. The earliest stage, overexclusive attention, is the most immature level. At this stage only small parts of stimuli are focused on. There is little or no incidental learning.

Bee (1975) has also researched the development of attention. In the early stages of life attention is captured by corners or edges of figures and also by the movement of stimuli. The baby's gaze is fixed rather than scanning. As a child matures, the gaze becomes less fixed and novelty of the stimulus becomes more relevant. This importance of novelty to gain attention remains throughout life.

The development of selective attention is also discussed by Piaget (1954). He mentions the strength of novelty of a stimulus in gaining attention, and stresses a moderate level of newness. In the process of assimilation, if the stimuli is too new there will be nothing to which it might be connected.

Soviet research in attention, headed by Yendovitskaya, (1971) also bears a very close resemblance to the relationship between the sensori-motor and pre-operational stages of cognitive development presented by Piaget.

Zaporozhets (1969) worked with children who could not do Piagetian conservation problems. He found that they could be trained rather quickly to perform the tasks

by teaching strategies for directing their attention to those dimensions which were essential for success on the problems.

Finally, in the overexclusive stage of attention, the development of speech is closely related to and a mediator of selective attention. Yendovitskaya (1971) discusses the relationship of gestural and vocal language of the socializing adult to the child's learning a means for organizing her attention. Mueller and Hallahan (1974) found that speech comes to serve as a mediator for attention and is far more efficient than the language of gestures. They observed that a child's developmental capacity for speech plays a vital role in voluntary selective attention.

In review, the overexclusive stage of attention finds attention to be basically involuntary in nature and occurs at first because of uncontrolled orienting responses to novel or intense stimuli. Language then directs selective attention and it becomes more social. As the child matures, mediators of attention become internalized (Mueller and Hallahan, 1974).

The second developmental stage of attention is the overinclusive stage (Ross, 1976). Attention shifts and becomes more voluntary. It is not bound by colors or shapes. Incidental learning is at its highest point

and a child learns as much about incidental features as central ones. Therefore, attention is not as efficient.

The highest level of attention is selective attention. Here incidental learning declines and individuals can voluntarily choose the relevant features of a task. Probably, those students who reach this phase earlier would be the better, more successful readers.

Visual Selective Attention in Relation to Reading

Where the learner focuses attention and what cues she selects, whether attention is directed at relevant features of the stimuli, has important implications for reading (Zeaman and House, 1967).

If a child is in the overexclusive stage of attention and begins the reading task, she will not be able to focus on all of the relevant stimuli. For example, during a lesson on the letter "d", the child might focus on the roundness of the letter, the stem of the letter or the color of the letter. The child will not be focusing on the entire shape of the letter.

During the same lesson, a child in the overinclusive stage of attention might focus on the entire blackboard, the teacher standing next to the letter on the board and many other visual stimuli within the child's

focal range. The child may appear to be "paying attention," but in reality she is not selectively attending to the appropriate stimuli.

It is not until the selective stage of attention that all the relevant aspects of the reading task-- letter combinations and spacing, punctuation, and letter shapes- can and will be focused on. The reading task is, at this stage, facilitated by the ability.

Elkind, Horn and Schneider (1965) found also that with children of matched intellectual ability, those who were slower readers did poorer on, and profitted less from, training on attentional tasks than did the average readers of comparable mental ability.

Turnure and Samuels (1972) found that sex was a major factor effecting the development of selective attention. Girls in first grade were found to be significantly better at selective attention tasks than boys.

Since there is agreement that selective attention is related to reading achievement, the experimenters questioned if this could be the reason that girls are superior to boys in beginning reading.

Samuels (1967) found that pictures in basal readers served as distractors for students who had difficulty with selective attention. He suggested keeping pictures

to a minimum during beginning stages of reading.

In a later study, Samuels (1971) found that when words were printed in color the learner might focus on the color and not the letter shapes. Although the rate of learning the words in color increased, without the color the words could not be identified.

Summary

Selective attention is a developmental ability. It varies in the level of development and quality of ability from one individual to another.

Ross identified three stages of attention: over-exclusive, overinclusive, and selective attention. In the overexclusive stage a child will focus on small parts of stimuli. In the overinclusive attention stage many extraneous and irrelevant stimuli are focused on besides the appropriate stimulus. It is not until the selective attention stage that all parts of the relevant stimuli and only the appropriate stimuli will be focused upon.

Research has shown that selective attention has crucial importance to reading achievement. Sex appears to be an important variable in selective attention. Females are found to be at more advanced levels of attention than boys in the early grades. Children at

the less advanced stages of selective attention may experience difficulty with words printed in color. They may also have problems with pictures on a page as they serve as distractors to attention.

Chater 3

Design of Study

Purpose

The purpose of the study was to investigate the ability of beginning readers to perform visual selective attention tasks.

A second purpose was to examine if measurement of this task in the visual area would complement significantly a traditional reading readiness assessment.

Methodology

Subjects

Fifty-seven students completing a kindergarten program in a local suburban school were employed as subjects.

All subjects were previously screened by means of the Ortho-rater by the school nurse to detect any visual impairments. Seven students were subsequently eliminated. Of the 50 subjects employed in the study, 31 were female and 19 were male.

Procedure

The subjects were given 25 cards which differed

from each other in: 1) shape of the card; 2) background color of the card; 3) Greek letter written on the card; and, 4) color of the Greek letter written on the card. The shapes of the cards included a circle, square, triangle, octagon, and a star. The color of the cards were red, orange, blue, green, and white. The Greek letters used were Ξ , α , η , θ , μ . The letters were written in blue, red, black, green, and brown felt markers.

Each subject was told by the experimenter, "In my hands I have some cards. On each of the cards I have written a Greek letter." One card was used as an example and each child was asked, "Do you see the Greek letter written on this card?" After the child confirmed having seen the Greek letter, the child was told, "I want you to put all the cards that have the same Greek letter written on them together. Only look at the Greek letter to put the cards together." Each child was further asked if they understood the directions. All the children said that they did understand.

The subjects were told to attend only to the Greek letter to sort the cards (central task). In doing the task, they needed to ignore the extraneous features of card shape and color, and letter color (incidental features).

After completion of the task, the number correctly grouped by the Greek letters yielded the central score. The children were also asked to recall the shapes of the cards and the color of the cards to see if any incidental learning had taken place.

Summary

Fifty students were asked to perform a visual selective attention task. They were instructed to sort 25 cards using the Greek letters written on the cards. This was the central task. In order to correctly perform the task, the subjects needed to ignore the card shapes, background colors of the cards, and color of the Greek letters written on the cards. These were the incidental features.

The subjects received a central score for the cards that were grouped correctly according to the Greek letter. The subjects also received an incidental score for each correct card shape and card color that they could recall.

Chapter 4

Findings and Interpretation of Data

Purpose

The purpose of this study was to investigate the visual selective attention ability of children completing a kindergarten program.

A second purpose was to examine if measurement of this task in the visual area would complement significantly a traditional reading readiness assessment.

Analysis of Data

Table 1 includes the central scores of the 50 students on the visual selective attention task. The mean central score for the total population was 81.8% with a standard deviation of 5.3. Seventy-eight per cent of the children demonstrated that they could perform the task correctly, grouping the cards by the Greek letters with 100% accuracy.

Table 1 also includes the incidental scores of the 50 subjects. The students were asked to recall the 5 background colors of the cards and the 5 card shapes to see if any incidental learning had taken place. The number of correct answers yielded the incidental score. The mean incidental score for those subjects who did

not receive zero as a central score was 55%. The incidental score for the subjects who did receive zero on the central task was 58%.

Table 1
 Subject Performance Scores on the Visual
 Selective Attention Task

Subject Number	Central Score Percentage	Incidental Score Percentage
1	0	60
2	100	10
3	100	40
4	100	30
5	0	60
6	100	40
7	100	50
8	100	0
9	100	60
10	100	60
11	100	60
12	100	80
13	0	60
14	100	40
15	100	60
16	100	0
17	100	60
18	100	30
19	0	40
20	0	50
21	100	60
22	0	100
23	100	90
24	100	30
25	100	30
26	100	70
27	100	60
28	100	60
29	100	70
30	100	60
31	100	40
32	0	50
33	100	70
34	100	60
35	40	60

Table 1 (cont'd)
 Subject Performance Scores on the Visual
 Selective Attention Task

Subject Number	Central Score Percentage	Incidental Score Percentage
36	100	70
37	100	60
38	100	80
39	100	70
40	100	40
41	100	80
42	68	30
43	80	70
44	100	40
45	100	60
46	100	60
47	100	70
48	100	50
49	0	50
50	100	40

The data supports Ross' statement that the incidental scores and central scores stand in an inverse relationship to each other (Ross, 1976). There was only one student who received 100% as an incidental score. The same student received zero for a central score. Conversely, the lowest incidental score was zero which was received by two subjects who both received 100% on the central task.

Table 2 shows that 42 subjects used the Greek letters to sort the cards, 3 used the shape of the cards, and 2 used the background color of the cards. Two subjects showed no apparent approach to their groupings. One student made no attempt to group the cards but merely took the cards from one pile and put them all into another single pile. No subject used the color of the Greek letters to group the cards.

Table 2

The Number of Subjects Attending
to Targeted and Non-targeted
Features of Stimulus Cards

Targeted (Central Task)	
Greek Letter	42
Non-targeted (Incidental)	
Card Shape	3
Card Background Color	2
Color of Greek Letter	0

Note. Two subjects demonstrated no apparent attention to any one feature.

Note. One subject made no attempt to group the cards.

Summary

The mean score on the central task for the total population was 81.8% with a standard deviation of 5.3. The results demonstrate that central and incidental scores have an inverse relationship to each other.

The results indicate, also, that the majority of children completing a kindergarten program can successfully perform a visual selective attention task with a high degree of accuracy.

Chapter 5

Conclusion and Implications

Purpose

The purpose of the study was to investigate the visual selective attention ability of children completing a kindergarten program.

A second purpose was to examine if measurement of this task in the visual area would complement significantly a traditional reading readiness assessment.

Conclusion

The results strongly demonstrated that central and incidental learning have an inverse relationship to each other. The results also indicated that the majority of children completing a kindergarten program can successfully perform a visual selective attention task with a high degree of accuracy.

Longitudinal evidence is necessary before it can be determined if measurement of this task in the visual area would compliment significantly a traditional reading readiness assessment. From the data collected, it appears that the information would be valuable for those students who score within the borderline range on other tests. The results from the visual selective

attention task could also be useful if a classroom teacher has some questions about a child's abilities.

Implications for Research

Since initial instruction is usually presented through the visual and auditory modes, it might be informative to investigate the possible correlation between selective attention ability in the visual and auditory areas; and further, to determine if that correlation is related in any manner to modality preference.

Research to determine if a child's modality preference does influence her ability to perform a visual and/or auditory selective attention task might be conducted. For example, if a child does in fact show a particular modality preference, according to an informal or formal assessment, will that child perform better on a selective attention task in that modality?

Further research in selective attention would be valuable considering the following variables: sex, intellectual ability, number of siblings, urban vs. suburban environment, pre-school experience and reading readiness training, and numerous others.

The most crucial research would arise from a longitudinal study of the same subjects. It would be val-

uable to investigate if the ability to perform selective attention tasks fluctuates with these subjects over different grade levels. Longitudinal data concerning future reading achievement should also be obtained. Examination of these data may possibly determine if performance on selective attention tasks is a valid and reliable indicator of future reading achievement.

A longitudinal investigation examining the interaction effect of the initial reading program into which the child is placed and her ability to perform a visual selective attention task should be conducted.

A final investigation to determine if selective attention can be improved with instruction and practice might also be undertaken. This would supply evidence in determining if selective attention ability is basically maturational, or if it can be fostered through direct instruction.

Implications for Classroom Practice

A child's performance on a selective attention task would be valuable information for a classroom teacher. A poor performance might indicate the need for delayed introduction to a formal reading program or specific instruction in this area before formal reading instruction begins. For example, if a child

appeared weak at the visual selective attention task, then the teacher might assume that the child would not be able to selectively attend to the relevant stimuli related to the reading task, specifically, all aspects of the letter shape, letter combinations, spacing, and punctuation.

Selective attention scores could also play an important role in determining the formal reading program in to which a child is placed. Teachers may be able to identify students weak in visual selective attention. Programs stressing auditory or V.A.K.T. approaches could be useful alternatives for these students. A child who is having trouble with visual selective attention should be placed in a basal reader with a minimal number of visual distractors, such as colors and illustrations. On the other hand, students who receive a high central score, could be placed in a reading program which stresses a visual approach without concern for visual distractors.

This study was conducted to investigate the ability of children completing a kindergarten program to perform a visual selective attention task. It was found that the majority of the children could perform the task with a high degree of accuracy. Since visual

selective attention has crucial importance to reading, those children who did experience difficulty with the visual selective attention task might experience difficulty with beginning reading tasks.

The use of a visual selective attention task, through the use of component selection, may be useful as an additional screening procedure, especially where traditional measures are inconclusive. Since scores show an inverse relationship to each other, information from the task might be useful to a kindergarten teacher organizing reading groups for the following year. For example, students who received a high incidental score with an accompanying low central score might have more success in a basal reader with a minimum of distractors, such as words printed in color and illustrations.

This study has been a primary investigation of the ability of kindergarten children to complete a visual selective attention task. It could possibly be used as a foundation for further research in the area of visual selective attention.

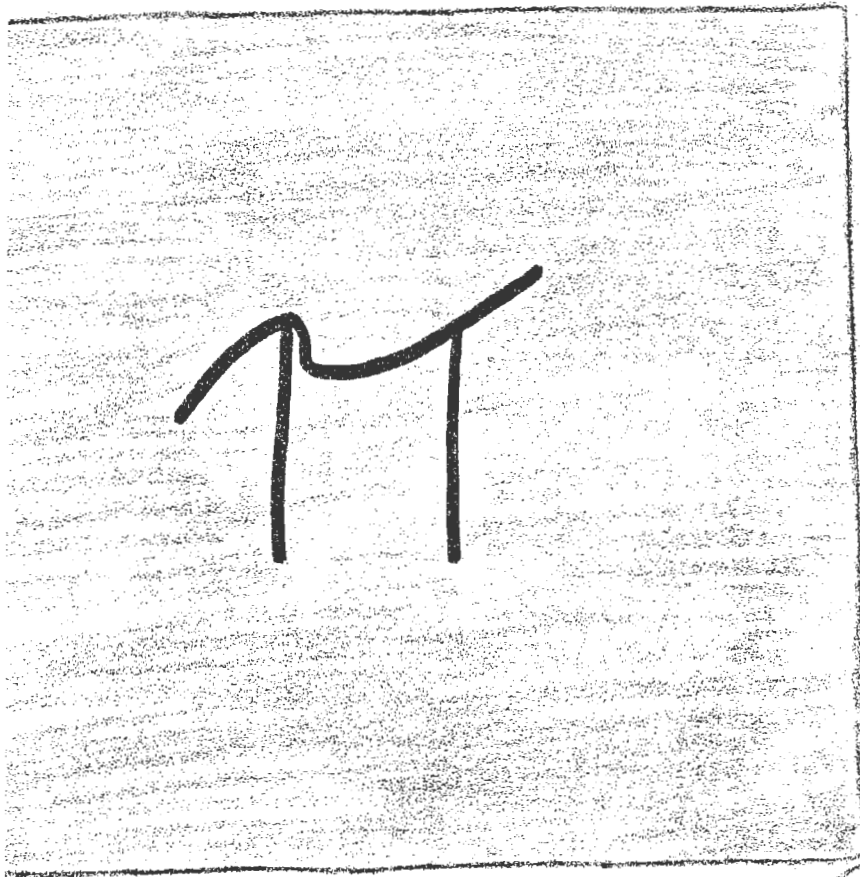
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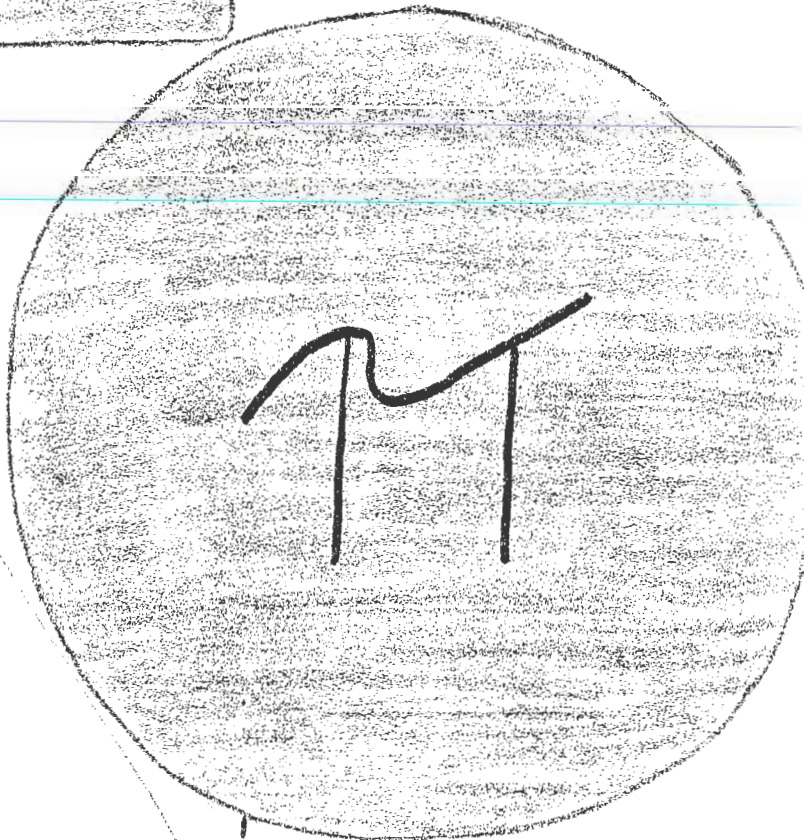
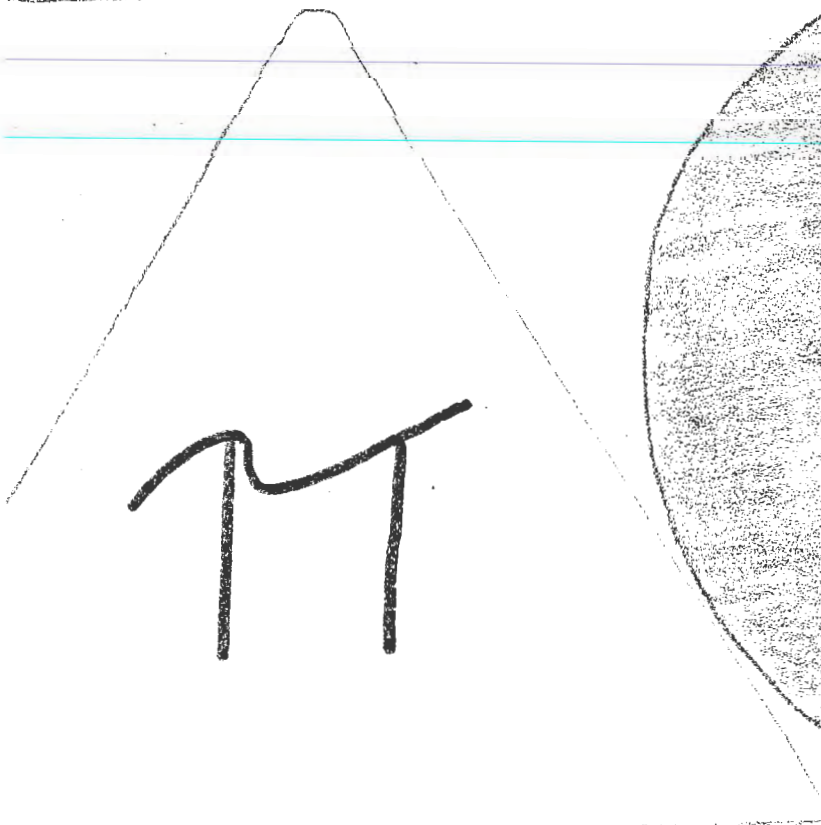
Appendix

Stimulus Cards Used in the Visual Selective Attention Task

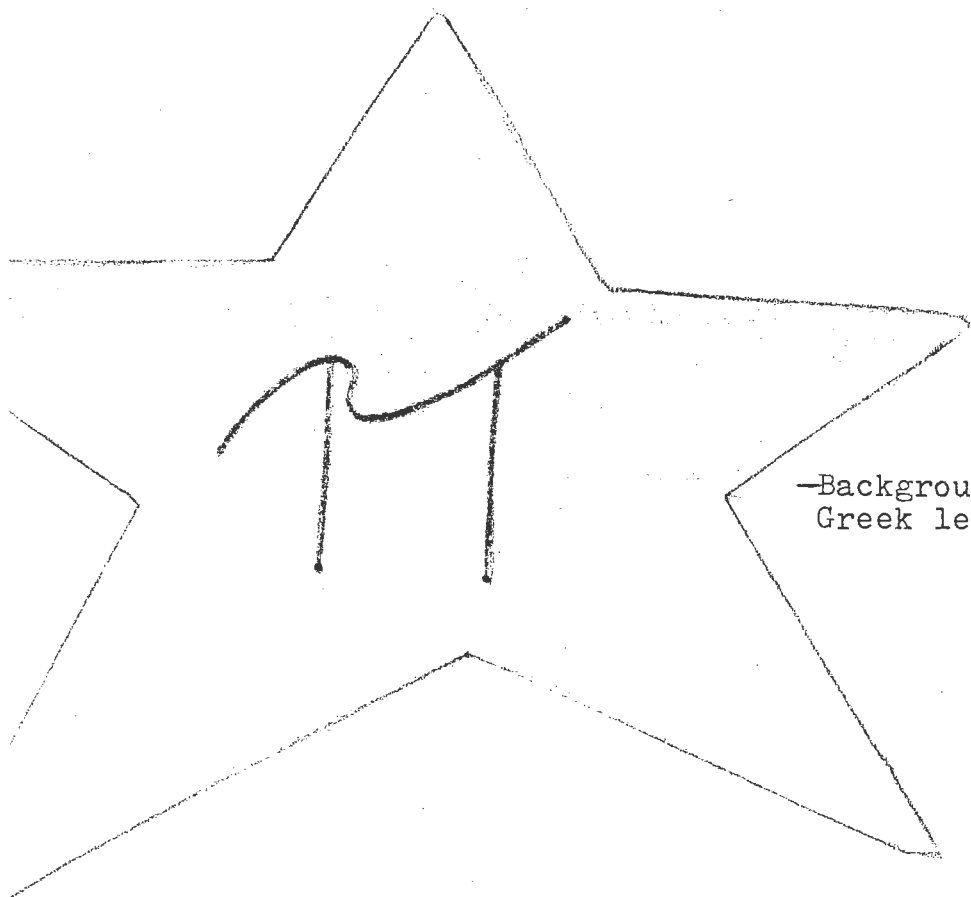


All cards are true to scale.

Background color= green
Greek letter color= red

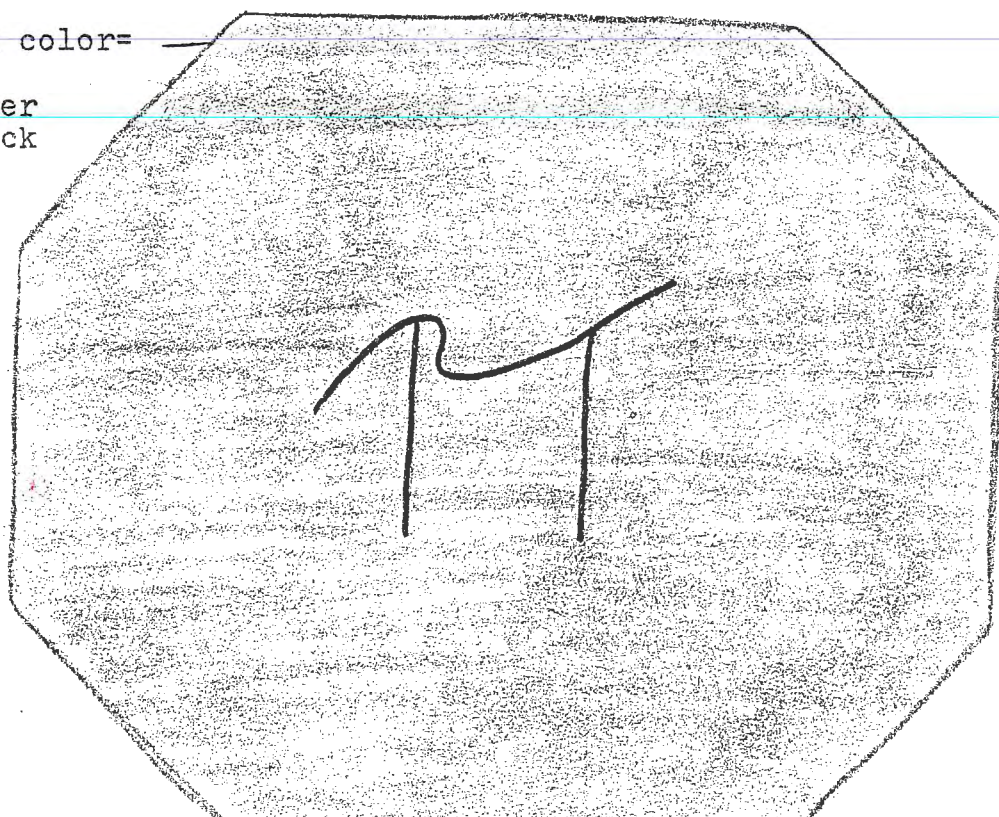


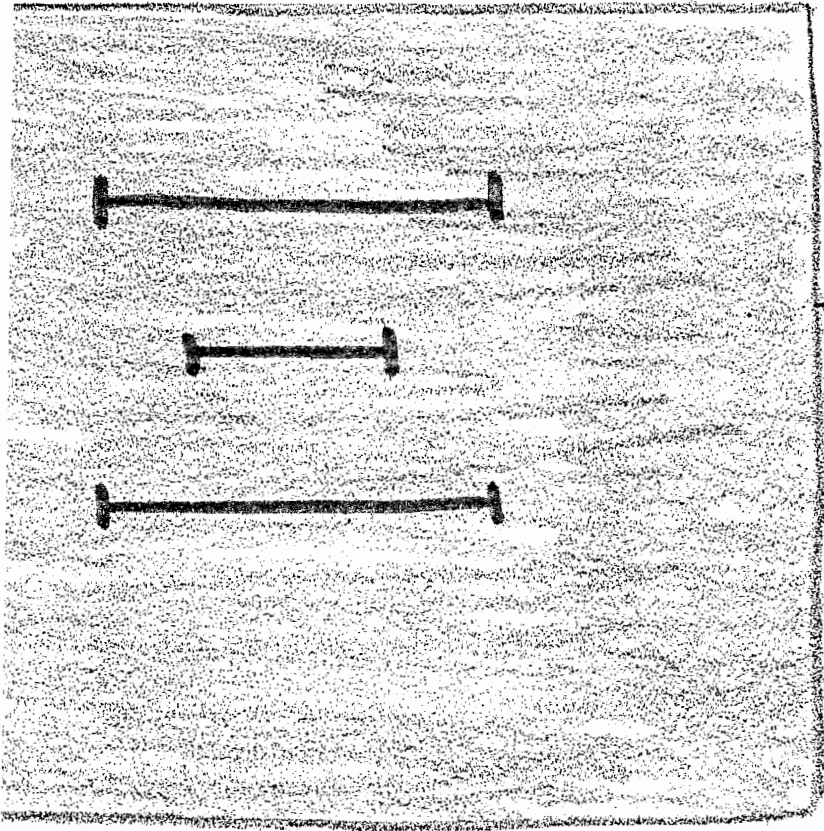
Background color= orange
Greek letter color= brown



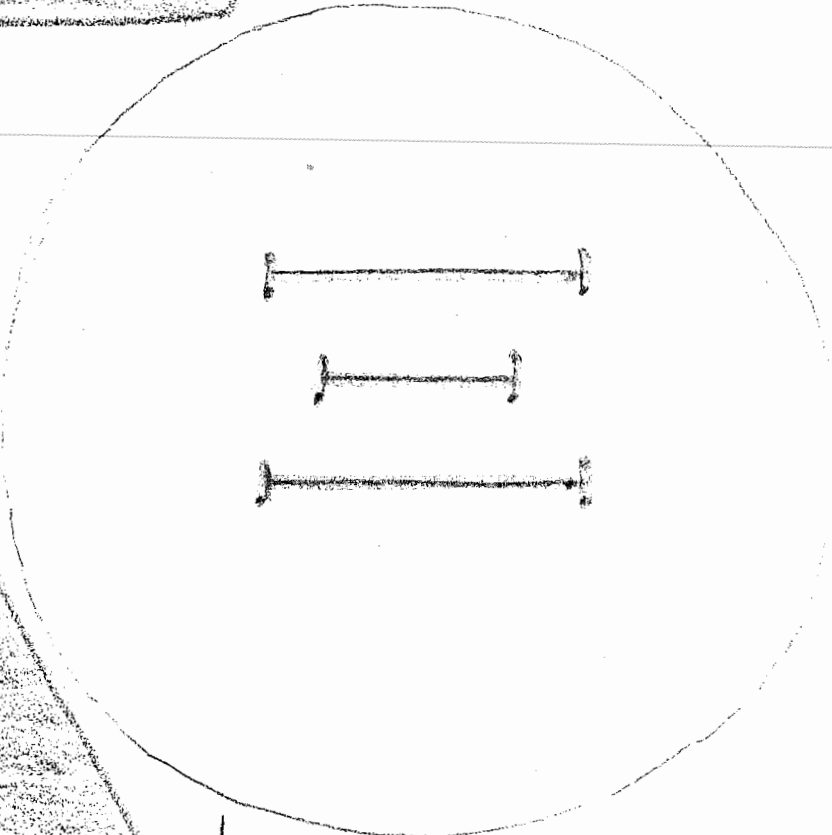
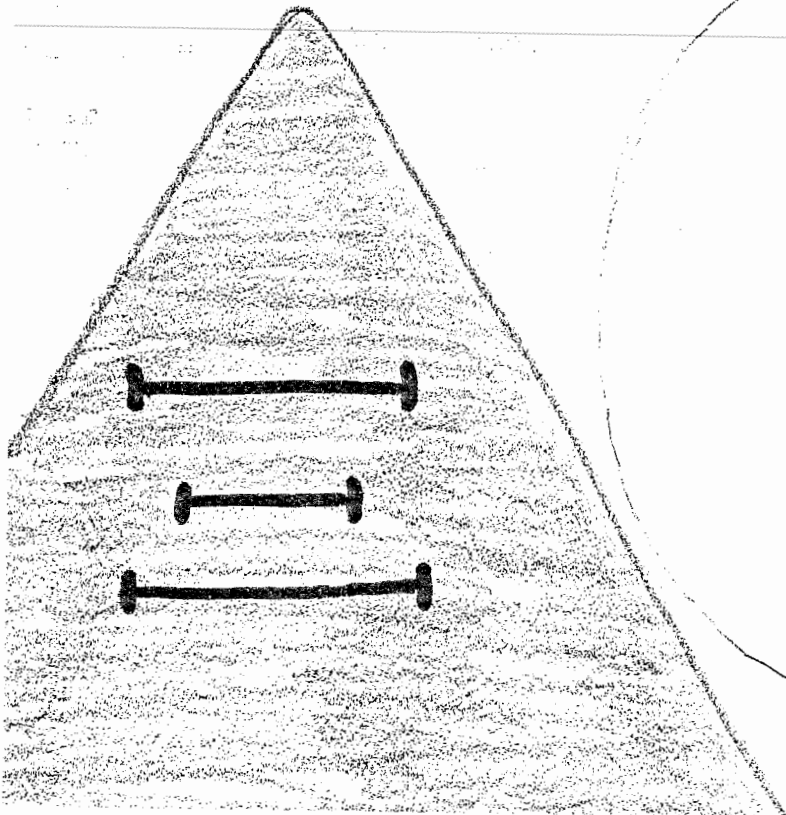
-Background color= blue
Greek letter color= blue

Background color=
red
Greek letter
color= black

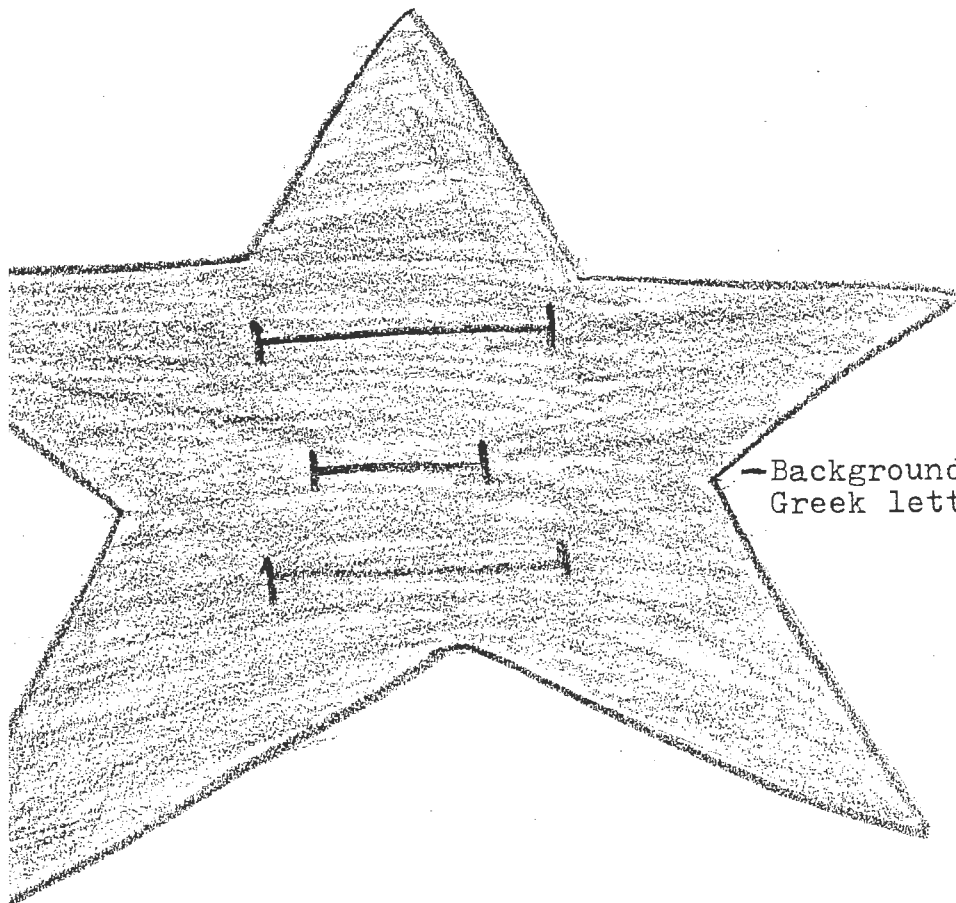




Background color= red
Greek letter color= green

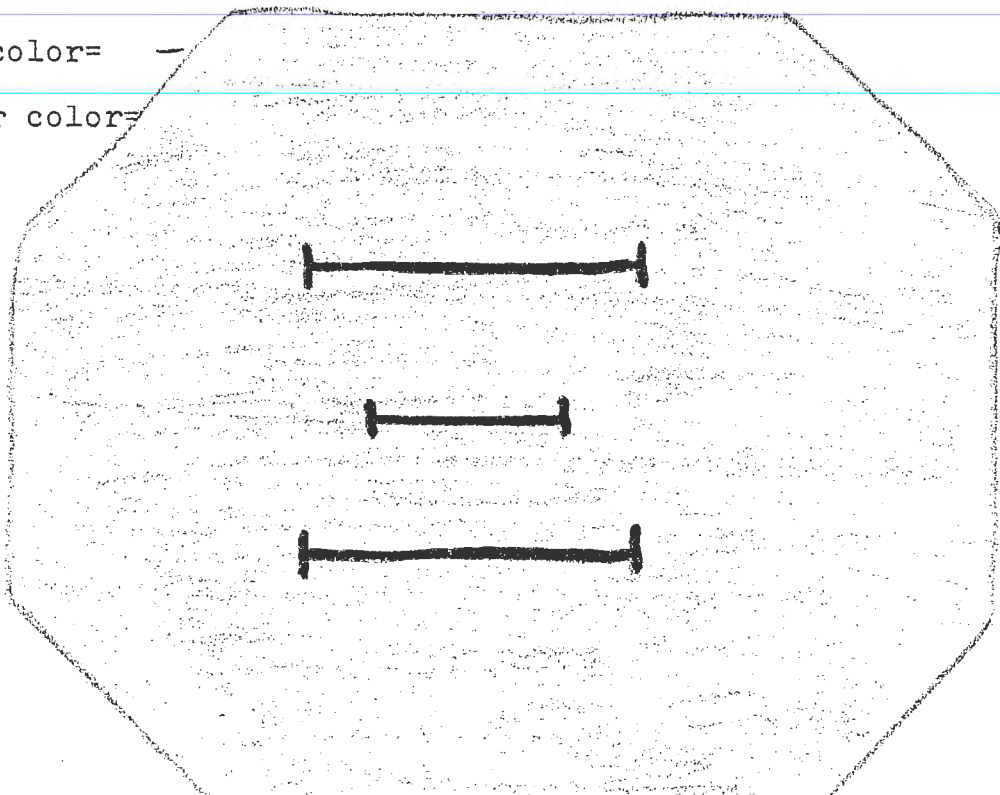


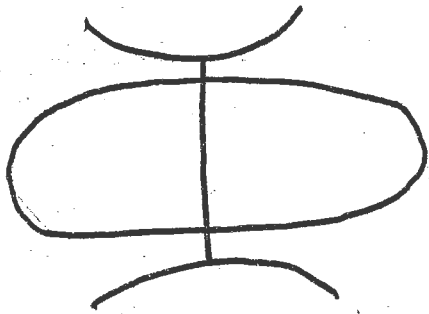
Background color= white
Greek letter color= blue



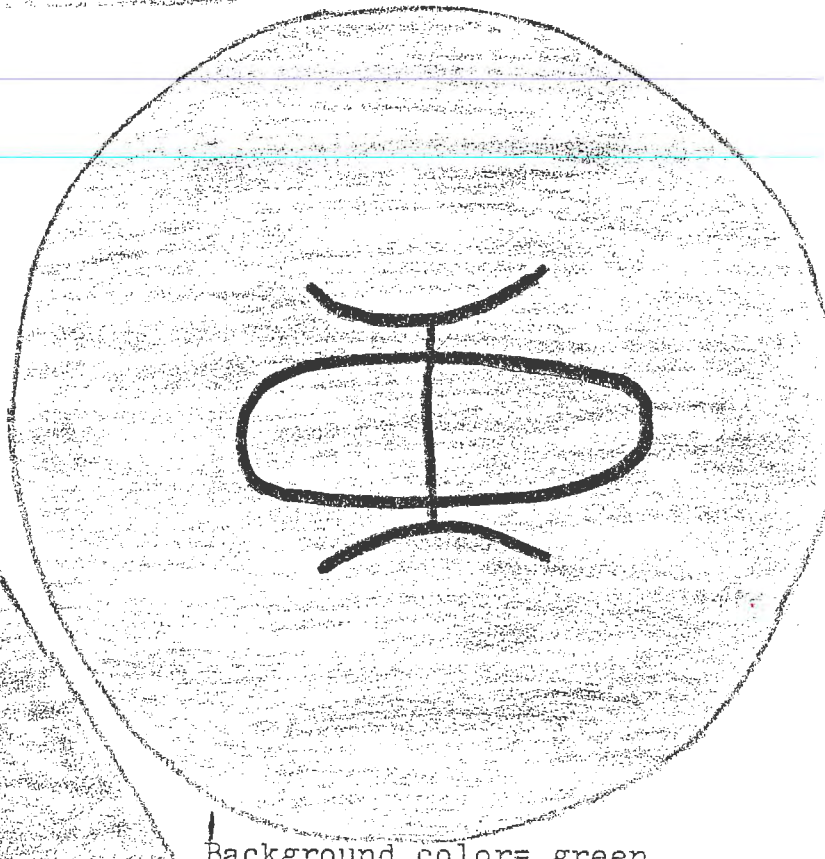
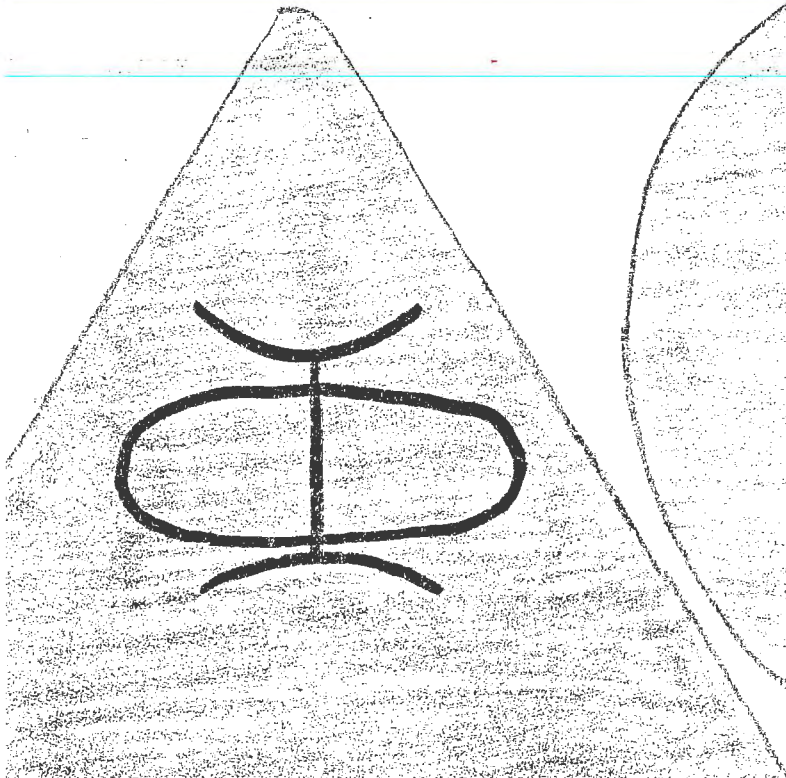
-Background color= orange
Greek letter color= black

Background color= blue
Greek letter color= red

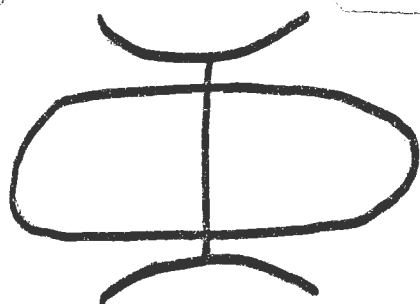




-Background color= blue
Greek letter color= black

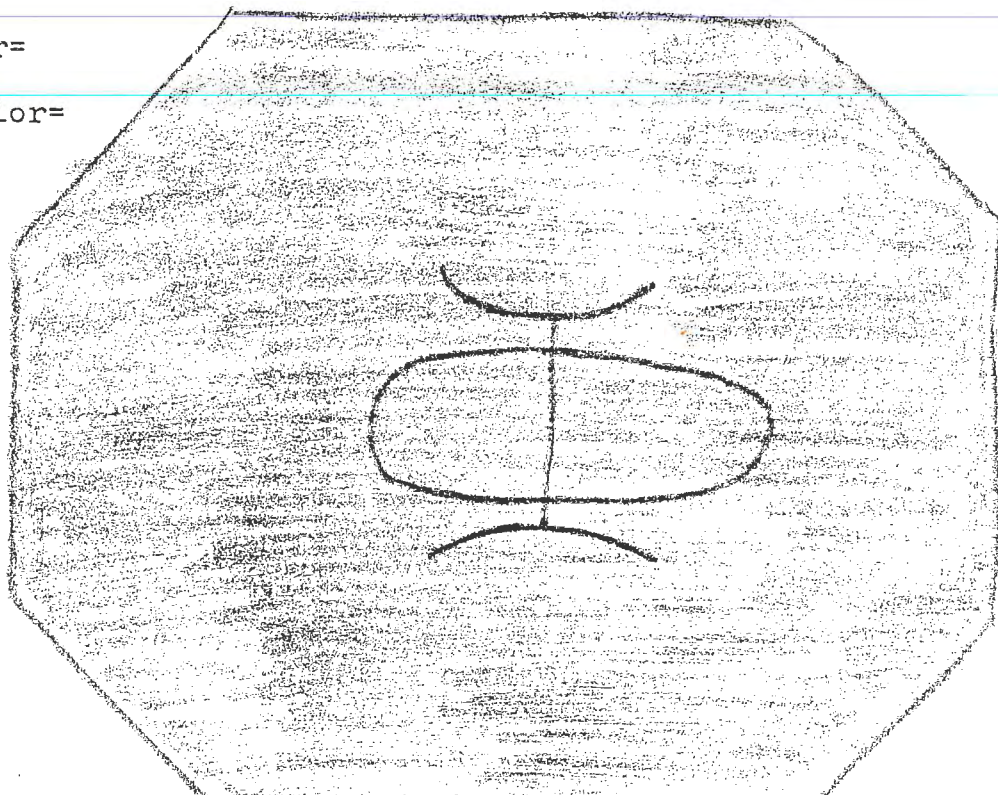


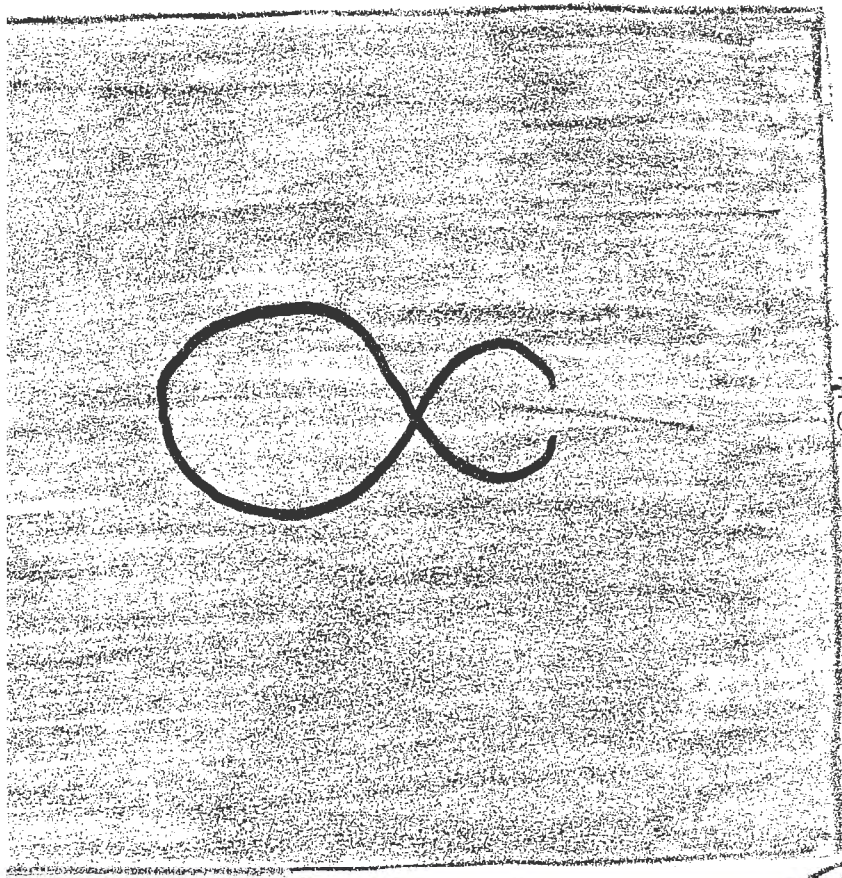
Background colors green



Background color= white
Greek letter color= brown

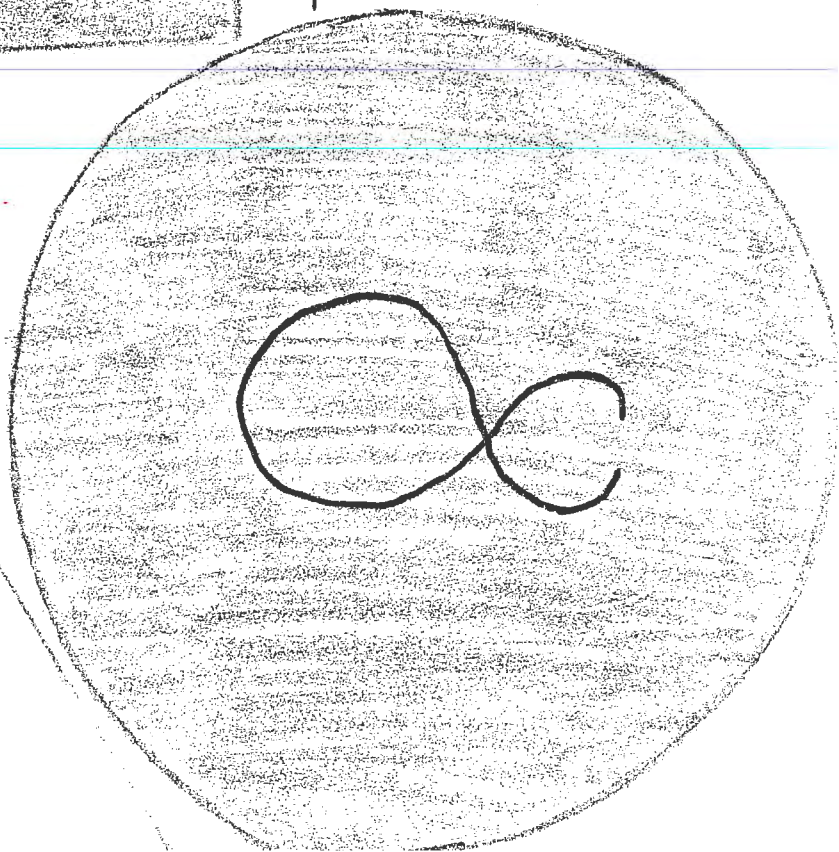
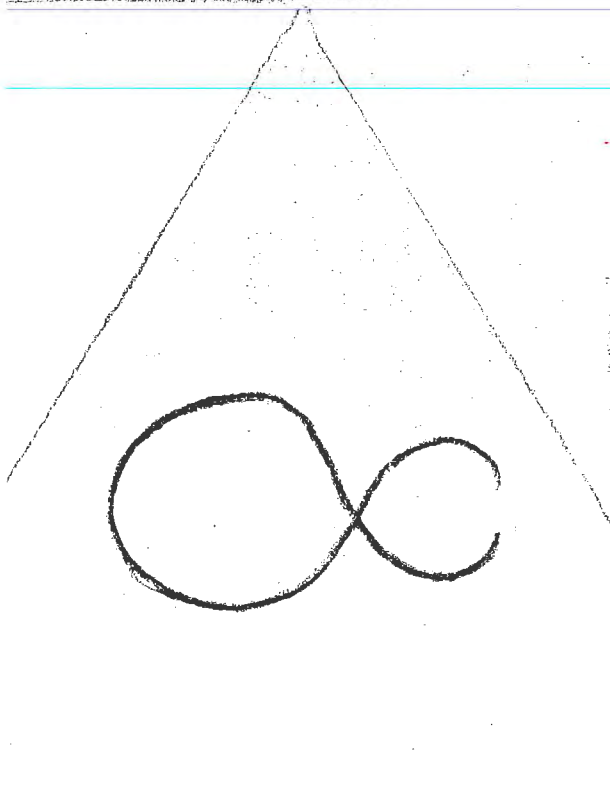
Background color=
orange
Greek letter color=
Blue

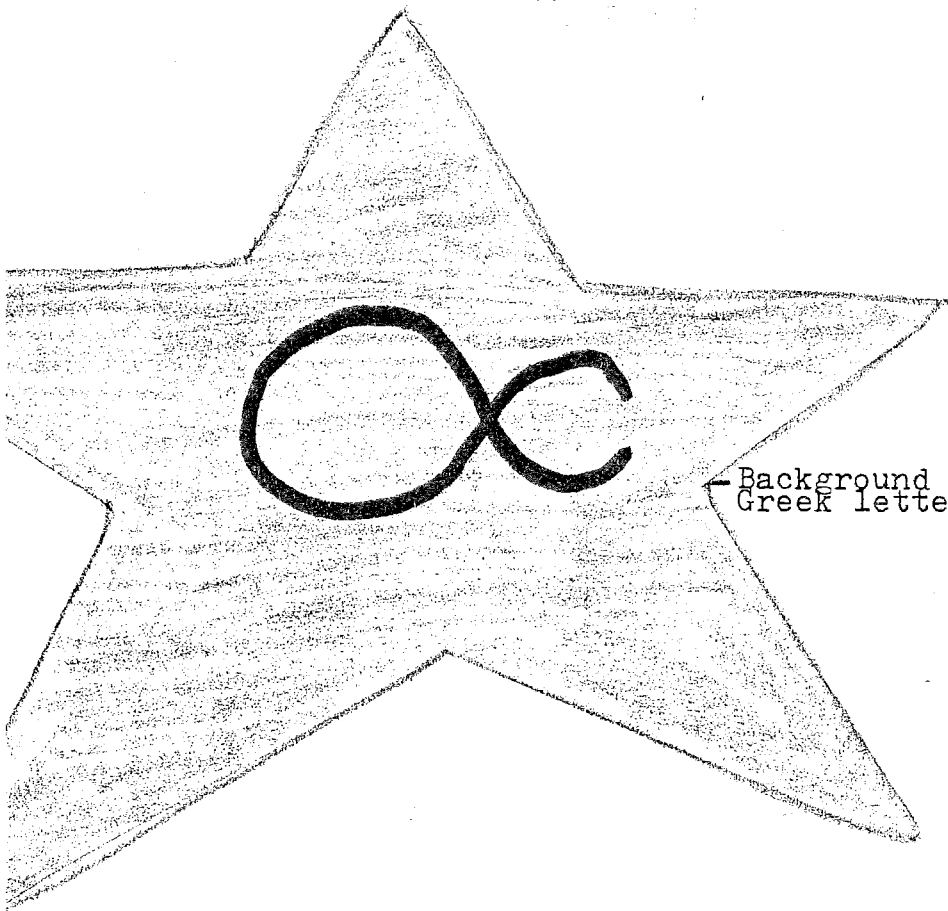




Background color= orange
Greek letter color= brown

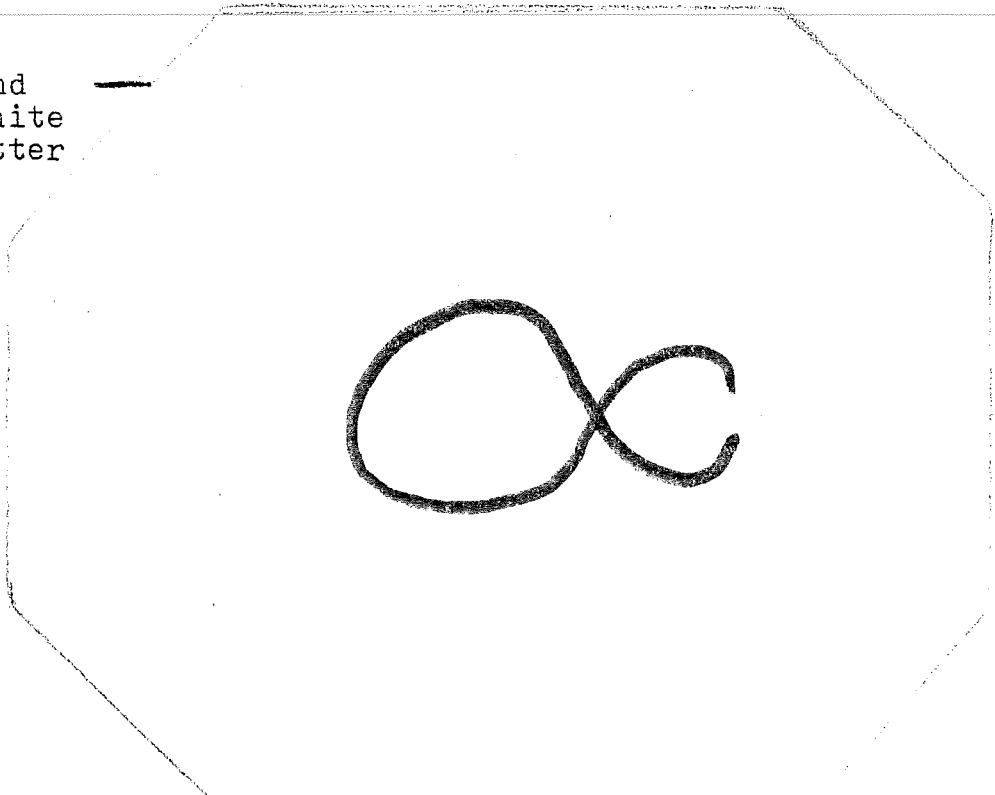
Background color= red
Greek letter color= black

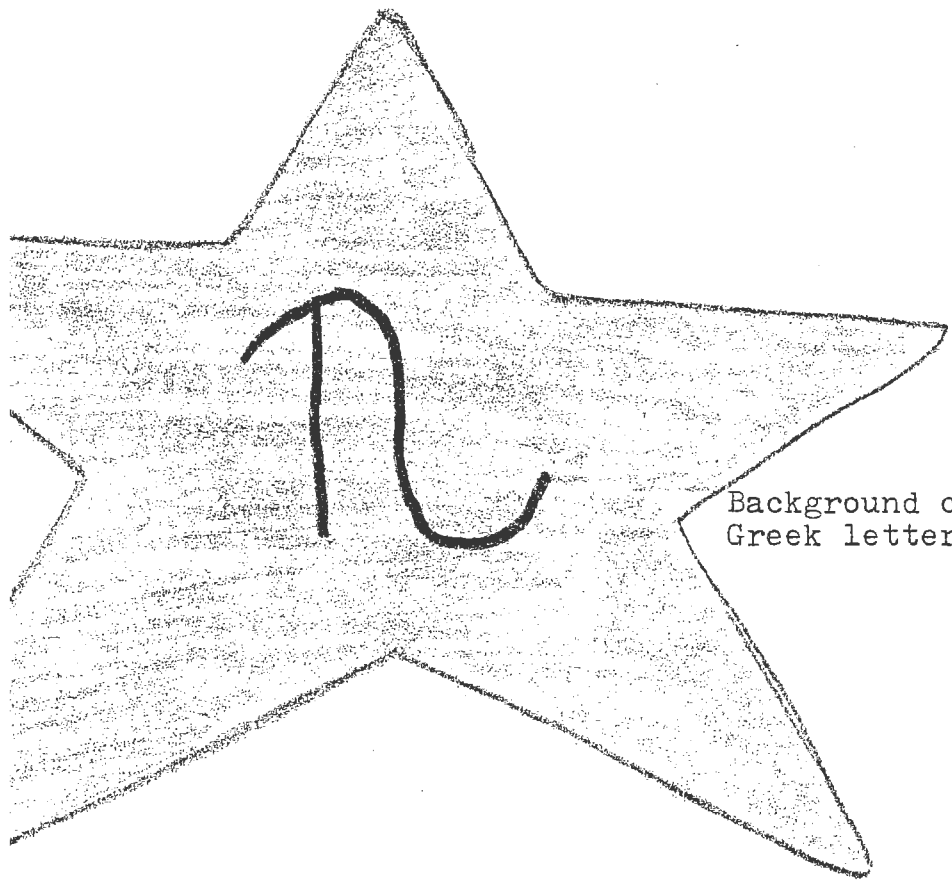




- Background color= green
- Greek letter color= red

Background
color= white
Greek letter
color=
green





Background color= red
Greek letter color= green

Background color=
orange
Greek letter color=
brown

