

AN INVESTIGATION OF THE AUDITORY 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

Mary Elise DeChristopher
State University College at Brockport
Brockport, New York
August, 1978

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Abstract

This study investigated the ability of beginning readers to perform auditory selective attention tasks through the use of dichotic listening tapes.

It also examined if the measurement of the task in the auditory area did complement significantly a traditional reading readiness assessment.

Subjects listened to a total of four tapes. The subjects were instructed to listen for certain categories mentioned by the female. After each tape, subjects were asked to recall those items mentioned by the female. The number of correct responses was tabulated to yield a central score. Subjects were also asked if they could recall any of the items mentioned by the male. The number of correct responses was tabulated to yield a incidental score.

The results of this study strongly demonstrated that central and incidental learning have an inverse relationship to each other. The results also indicated that children can perform an auditory selective attention task after completing a kindergarten program, with varying degrees of accuracy.

Longitudinal evidence is necessary before it can be determined if this task would complement signifi-

cantly a traditional reading readiness assessment. The use of dichotic listening tapes may be useful as an additional screening procedure especially where traditional measures are inconclusive.

Acknowledgements

When one completes a task which, in the beginning seemed insurmountable, several people are usually responsible. The time and effort of many people have enabled this study to be carried out.

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Chapter I

Statement of the Problem

Selective attention has been a topic in reading which gains popularity at different times in history. Since selective attention is vital to the reading task, one can assume that children who are able to selectively attend to certain tasks will be ready for reading earlier than those students who cannot selectively attend to the same task.

A child must be able to selectively attend to the relevant stimuli of the task before the reading process can begin. Therefore, it would be logical to assume that those children deficient in selective attention could experience difficulties at beginning reading tasks.

The major problem related to selective attention is finding a valid instrument which, in fact, does assess selective attention. This study is investigating the use of dichotic listening tapes as a possible assessment tool for selective attention in the auditory mode. Dichotic listening tapes may be a useful additional instrument for placing children, having completed a kindergarten program, in a beginning reading class.

By investigating children's ability to selective-

ly attend to one voice in a series of three dichotic listening tapes, it is hoped that an additional screening procedure for beginning readers might be provided. It is an assumption 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 auditory selective attention tasks.

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

Need for the Study

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

The stimuli to which the child chooses to attend can include the color of the blackboard, the teacher's

voice, the siren on a police car racing down the street. Some of the chosen stimuli may be appropriate to the learning situation and others may not.

The need for this study is to determine if the task of auditory selective attention, through the use of dichotic listening tapes, 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 auditory selective attention. This study is a primary investigation of the ability of kindergarten children to complete the task of auditory selective attention.

Definitions

Incidental learning. Incidental learning would involve giving a subject a central task to attend to. Any learning that arises from this task accounts for a central score. If learning arises from the tasks which the subject is instructed to ignore, the learning is incidental to the central task and is reflected in an incidental score.

Component selection task. Component selection task will involve a task such as this: While listening to a dichotic tape through headphones, the subject is in-

structed to listen to the woman's voice and ignore the man's voice. The subject is also instructed to listen for particular categories (sports, animals, colors). If learning arises from the tasks which the subject is instructed to attend, then the learning is reflected in a central learning score.

Selective attention. Selective attention is a stage in a developmental process. As children mature, attentional abilities develop from fixed focus on small parts of stimuli (Bee, 1975). This earliest stage, over-exclusive attention, is the most undeveloped level. There is little or no incidental learning at this stage.

The next stage, overinclusive attention, becomes voluntary. Incidental learning is at its highest point and a child learns as much about incidental features as he does about central ones. 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 other children talking, the noises outside of the classroom or

the teacher's instruction for other children, while relevant aspects such as letter combination and spacing must be attended to. 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 print on the page, the other children's voices 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 child will also be able to screen out all extraneous noises which inhibit reading. The reading task is, at this stage, facilitated by this ability.

Dichotic listening task. Dichotic listening tasks involve the input of two different auditory messages, usually through earphones, so that one message is received by the right ear with the differing message received by the left.

Limitations of the Study

This study will include 50 students completing a kindergarten program in a local suburban school. Results might be different if inner-city students were being studied. It is assumed that children raised with a

substantial amount of noise in their environment are able to screen out noises and distractions better than those children who were raised in a less noisy environment.

Summary

This study will be an investigation of the ability of children completing a kindergarten program to perform auditory selective attention tasks through dichotic listening tapes. 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 tasks 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 in the identical tasks.

Chapter II

Review of the Literature

Introduction and Purpose

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 of studying the 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 incidental learning and dichotic listening.

Related Research

Research shows that selective attention improves with age up to early adolescence. 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, and also in the quality of their ability.

Ross (1976) suggests that as a child matures there are certain stages of selective attention. The earliest

stage, overexclusive attention, is the most immature level. This is where small parts of stimuli are focused on. This is the overexclusive attention stage. There is little or no incidental learning at this stage.

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), who mentions the strength of novelty of a stimulus in gaining attention. He stresses a moderate level of newness. In the process of assimilation, if the stimuli is too new there will be nothing to connect it to.

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

Zaporozhets (1969) has been able to demonstrate with children that ability to do Piagetian conservation prob-

lems can be trained. Children are taught nonconserver strategies for directing attention to those dimensions which are 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 discusses the relationship of gestural and vocal language of the socializing adult to the child's learning a means for organizing his 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 is 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. Attention shifts and becomes more voluntary. It is not bound by colors or size. Inci-

dental 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.

Ross says that it is crucial to assess a child's developmental level of attention as early as possible, so that the mode of teaching and pace can be appropriate to the child's readiness to use selective attention.

Auditory Selective Attention in Relation to Reading

Where the learner focuses attention and what cues he 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, he will not be able to focus on all of the relevant stimuli. For example, during exposure to the word "dog", the child might listen only to the beginning sound of the word. The child will not be listening to the entire sound of the word.

During the same lesson, a child at the overinclusive stage of attention might listen to the teacher's voice saying the word, children whispering next to him, and even his stomach growling. The child may appear to be "paying attention", but in reality he is not selectively attending to the appropriate stimuli.

It is not until the selective attention stage that all the relevant aspects of the reading task—beginning and ending sounds of words, combination of letter sounds, and fine discriminations of letter sounds—can and will be listened to. 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 affecting the development of selective attention. Girls were found to be significantly better at selective attention tasks than boys in first grade. 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.

Summary

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

Ross identifies 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 stimuli. 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.

This study was done in concert with a study investigating visual selective attention abilities of beginning readers. The subjects employed were the same for both investigations. Research for the two studies overlaps; therefore, sections of these two papers will be very similar.

Chapter III

Design of Study

Purpose

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

A second purpose was to examine if measurement of this task in the auditory 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 an audiometer by the school nurse to detect any hearing impairments. Seven students were subsequently eliminated. Thirty-one of the subjects used in the study were female and 19 were male.

Materials and Procedures

Professionally prepared tapes were designed for the dichotic listening task. Decibel levels as well as tone quality were controlled. The production of the tape was

done on a low noise, high frequency tensilized polyester tape. This tape is specially designed for voice recording.

Three sets of dichotic listening tapes were played for each subject. The subjects were told beforehand to attend only to the female's voice. Each tape included a female voice and a male voice. The subjects were also told to which category they should attend (animals, colors or musical instruments). The three tapes mentioned three components of each category. For example, three animals were mentioned by both the female and the male. The animals mentioned by the female and the male were different. Each child was also given a practice tape. The category used on the practice tape was sports. The categories to which the subjects attended were contextually and semantically independent of the passage. In this way no extraneous clues for the correct response were given to the subjects.

The children were informed that they were to "put their headphones on and listen to the magic tape recorder. In one ear you will hear a man talking and in the other ear you will hear a lady talking. I want you to only listen to the lady. After the tape is over, I want you to tell me the three animals (colors or instruments) that

the lady mentioned in her story." The animals recalled by the children, which were mentioned by the female, accounted for the central learning that had taken place. The children were also asked, "Do you happen to remember any of the animals which the man mentioned?" The animals recalled by the children, which were mentioned by the male, accounted for the incidental learning that had taken place. At this point, the children were reassured that they were only suppose to recall the lady's voice.

After completion of the task, the number of correct responses for the female voice was tabulated to yield a central score. The number of correct responses for the male voice was also tabulated to yield an incidental score.

Summary

Fifty students were asked to perform auditory selective attention tasks. Subjects were instructed to attend only to the female voice on a series of three dichotic tapes. A central score was obtained by calculating correct responses. An incidental score was obtained by calculating the responses which pertained to the incidental factors (male voice).

Chapter IV

Findings and Interpretation of Data

Purpose

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

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

Analysis of Data

Table 1 includes the central and incidental scores for the 50 subjects employed for this study. Forty-seven of the 50 subjects were able to perform the auditory selection task with a varying degree of accuracy (11 to 88%). Three subjects received a score of zero. The mean central score for the total population was 3 (33%) with a standard deviation of 2.2. Of the 50 subjects employed, only 10 received any incidental score. The mean incidental score of these 10 subjects was 1.3 (13%), while the mean incidental score for the entire population was .26 (2.6%).

Table 1
Subject Performance Scores on Auditory
Selective Attention Tasks

Subjects	Raw Central Score	% of Central Score	Raw Incidental Score	% of Incidental Score
1	2	22	0	0
2	4	44	0	0
3	2	22	0	0
4	4	44	0	0
5	6	66	0	0
6	3	33	0	0
7	5	55	0	0
8	4	44	0	0
9	4	44	0	0
10	2	22	0	0
11	4	44	1	11
12	5	55	0	0
13	0	0	0	0
14	1	11	0	0
15	5	55	0	0
16	3	33	0	0
17	6	66	0	0
18	3	33	0	0
19	1	11	1	11
20	1	11	1	11
21	4	44	0	0
22	3	33	0	0
23	4	44	0	0
24	4	44	0	0
25	5	55	0	0
26	4	44	0	0
27	4	44	1	11
28	6	66	0	0
29	0	0	1	11
30	5	55	0	0
31	2	22	3	33
32	0	0	0	0
33	7	77	1	11
34	5	55	0	0
35	4	44	0	0
36	6	66	1	11

Table 1 (cont'd)
 Subject Performance Scores on Auditory
 Selective Attention Tasks

Subjects	Raw Central Score	% of Central Score	Raw Incidental Score	% of Incidental Score
37	6	66	0	0
38	1	11	2	22
39	4	44	0	0
40	2	22	0	0
41	2	22	0	0
42	0	0	0	0
43	2	22	1	11
44	5	55	0	0
45	7	77	0	0
46	6	66	0	0
47	3	33	0	0
48	8	88	0	0
49	1	11	0	0
50	6	66	0	0

Table 2 includes the central and incidental scores of those 10 subjects who received any incidental score. Sixty per cent of the 10 children receiving any incidental score, received a central score lower than the mean of the total population. Eighty per cent of those subjects receiving any incidental score, scored 44% or lower on the auditory task. This appears to verify Ross' theory that incidental scores and central scores stand in an inverse relationship to each other (Ross, 1976).

Table 2
Central and Incidental Scores of the
10 Dual Scoring Subjects

Central Score	0	1	1	1	2	2	4	4	6	7
Incidental Score	1	1	1	2	1	3	1	1	1	1

Those students who received the highest incidental scores, received the lowest central scores except for 3 subjects (subjects 13, 32, and 41) who received a score of 0 on both the incidental and central tasks. This might suggest that the task was too difficult for these three subjects.

Of the 17 subjects who scored 55% or better on the central score, only 2 received any incidental score; in each case a score of 1. This also suggests that the greater the selective attention to the central task, the lower the incidental score.

Test results might indicate that the subjects ability to perform the task improves with practice. This may suggest that the skill of auditory selective attention is, to an extent, learned and might well be improved through direct instruction.

Longitudinal evidence is necessary before it can be determined if this task in the auditory area would complement significantly a traditional reading readiness assessment.

Summary

The mean score on the central task for the total population is 3 (33%) with a standard deviation of 2.2. Results strongly demonstrate that central and incidental

learning have an inverse relationship to each other.

The results indicate, also, that children completing a kindergarten program can perform an auditory selective attention task with a varying degree of accuracy (mean score of 33%). Due to these results, the use of dichotic listening tapes may be useful as an additional screening procedure especially where traditional measures are inconclusive.

Chapter V

Conclusion and Implications

Purpose

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

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

Conclusions

The results strongly demonstrated that central and incidental learning have an inverse relationship to each other. The results also indicated that children can perform an auditory selective attention task, after completing a kindergarten program, with varying degrees of accuracy. It also appeared that the subject's ability to perform the task improves with practice.

The use of dichotic listening tapes may be useful as an additional screening procedure especially where traditional measures are inconclusive. The use of the dichotic tapes is also economical even in a one to one situation. Since scores seem to show an inverse relationship to each other, information may be very useful

to a kindergarten teacher who is 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 highly structured reading group with a minimum of auditory distractors, while students who received a high central score would probably be able to work more independently.

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 his 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 preference, according to a formal and/or informal 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 valuable 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 his ability to perform an auditory selective attention task should be conducted.

A final investigation to determine if selective attention can be improved with instruction and practice might 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 auditory 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.

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

This study has been a primary investigation of the ability of kindergarten children to complete an auditory selective attention task. It could possibly be used as

a foundation for further research in the area of auditory selective attention.

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Appendix A

Practice tape 1
Category, sports
Female voice

David wanted to play baseball this summer. School was almost over and soon the season would begin. David could not wait to be placed on a team. Soccer had been David's favorite sport during the school year. He also liked swimming, which he learned in gym class. David liked most all sports and he looked forward to learning many new ones as he went through school.

Male voice

Theresa was going to be in her first tennis tournament on Saturday. She was very excited. Everyone in her family had won a trophy for something except her. Her brother John had a trophy for bowling, and her brother Joe had a lot of trophies for basketball. Now it was Theresa's turn. She was very sure that she would win.

Appendix B

Test tape 1
Category, colors
Female voice

Mary and her mother wanted to get a kitten for their home. One day after school, Mary and her mother stopped at an old green house. There was a sign on the front lawn that read, "FREE KITTENS", it was painted in big, black letters. Mary was very excited. When Mary and her mother went upstairs, the lady showed them two tiny, gray kittens. Mary could not decide which one she liked best. "They are both so cute," she said. "I don't know which one I want." After a few minutes Mary's mother had an idea. "Why don't we take them both," she said. "That way they won't be lonely."

Male voice

Susan had a new blue dress for her birthday party. Soon all of the children were coming over to play games and win prizes. While Susan was getting dressed, her two friends, Joan and Bill came over. Joan gave Susan a big yellow truck with parts that really moved. Bill gave Susan a doll with beautiful red hair. Both children were sure that Susan would love their gifts. At one o'clock, all of Susan's friends had come. They were playing games and having fun. It was a very happy birthday party for Susan.

Appendix C

Test tape 2
Category, instruments
Female voice

Denise was all ready for her music recital. She had practiced her piano piece for over a month, and tonight every one would hear her. Pam Dennis would be playing the flute, and Cindy, Denise's best friend, would be playing the violin. The girls had practiced together every night for the past week. They were all sure that they would do a good job. At the recital the three girls became very nervous, but once they began to play, they all relaxed. After the recital, Denise's mom took all three girls out for ice cream for doing such a fine job.

Male voice

This year John would get to play an instrument at school. His best friend Gary played the drums and his cousin Julie played the guitar, so he did not want to play either of those instruments. "What shall I play," John asked himself over and over again, but he could not decide. Finally John asked his dad what instrument he would play. John's father left the room for a few minutes, and he came back with a dusty old case. When John opened the case, he saw a shiny silver trumpet inside. "This

Test tape 2 (cont's)
Category, instruments
Male voice

is the instrument that I use to play," said John's father. John decided that he would play the same instrument that his father had played.

Appendix D

Test tape 3
Category, animals
Female voice

*My big brother Todd found a baby eagle. Todd brought him home and named him Butch. How wild he looked. For days Butch would not eat and we were afraid that he would die. A few days later, my little brother Jim made friends with Butch, and soon he was eating. He even learned how to play with our dog Taffy. We all played with Butch but most of all he was Jim's pet. Soon Butch became very big and we knew that we could not keep him. A zoo near our home wanted him, and that is where Butch is today; right next to the tigers' house.

Male voice

*Every one knows Smoky the Bear. He says the same thing over and over again, "only you can prevent forest fires." People all over the country talk about fires. Forest fires hurt our land and they hurt our animals. Many deer have died because they have become frightened. Rabbits have had to find new homes after their old ones were burned away. We must be more careful with fire. Smoky helps us to prevent forest fires by telling us the rules over and over again. He always makes us feel good by saying, "thank you for being careful."

*These two stories were adapted from the The Reader's Digest Skills Builder Series, level 1+.
