

THE ABILITY OF EMOTIONALLY DISTURBED CHILDREN
TO PROCESS AUDITORY INFORMATION

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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May, 1981

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Abstract

This study investigated the auditory processing abilities of emotionally disturbed children. Areas examined were: auditory discrimination, auditory sequential memory, auditory closure, and auditory selective attention.

Subjects were given four tests used to measure auditory processing: The Wepman Test of Auditory Discrimination; The Illinois Test of Psycholinguistic Abilities, auditory sequential memory and auditory closure subtests; and a professionally prepared dichotic listening tape.

The results of this study showed that although not all emotionally disturbed children have auditory processing problems, there is a tendency for a problem to occur in at least one area of auditory processing.

Most of the problems were found in the areas of auditory selective attention, auditory sequential memory, and auditory closure. Few problems were found in the area of auditory discrimination.

Acknowledgements

My deepest appreciation is extended to my husband and to my parents who gave me much support during my studies.

I would also like to extend my thanks to Dr. Begy for his enthusiasm in helping me complete this thesis project.

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Chapter I

Statement of the Problem

Although a great deal of research has been conducted in the area of auditory processing in general, its relation to reading, and auditory processing of the learning disabled, research is lacking in the area of auditory processing abilities of the emotionally disturbed. According to Butler (Van Hattum, 1980, p. 144), "Recent research does indicate that children whose emotional problems are much less severe than those of the autistic or schizophrenic child also demonstrate auditory-processing problems." This statement seems to encompass all inseverely emotionally disturbed children. In researching the area of the emotionally disturbed and auditory processing, lack of empirical evidence was found to support the above statement. Therefore, this is an area which needs further investigation.

Purpose

The purpose of this study was to investigate the statement made by Butler, "Recent research does indicate that children whose emotional problems are much less severe than those of the autistic or schizophrenic child also demonstrate auditory-processing problems" (Van Hattum, 1980, p. 144).

Definitions

1. Emotionally disturbed - P.L. 94-142 definition: "A condition exhibiting one or more of the following characteristics over a long period of time and to a marked degree of performance. (a) an inability to learn, which cannot be explained by intellectual, sensory, or health factors, (b) an inability to build or maintain satisfactory interpersonal relationships with peers and teachers, (c) inappropriate types of behavior or feelings under normal circumstances, (d) a general pervasive mood of unhappiness or depression, (e) a tendency to develop physical symptoms or fears associated with personal or school problems."
2. Auditory processing (perception) - The short term processing or categorization of information received aurally; the process by which information is extracted and related to prior experience; the meaningful interpretation or discrimination of sounds. Some components of auditory processing are: (a) auditory discrimination - The ability to distinguish between sounds, including those that are grossly different from those which are highly similar, (b) auditory sequential memory - The ability to recall the sequential ordering of auditory units, (c) auditory closure - The ability to infer the presence of a sound when it is absent or not heard, (d) auditory selective attention - Selective

focusing by the central nervous system upon portions of incoming auditory stimuli.

3. Dichotic listening - Attending to and comprehending one or two messages presented binaurally.

Limitations of the Study

There are a variety of aspects to the definition of the emotionally disturbed. Each of the subjects fell under different aspects of the definition. Due to the age range of the tests, a small sample size was used, all from a residential setting.

In The Illinois Test of Psycholinguistic Abilities, the psycholinguistic age was computed only up to 10.3 for the auditory sequential memory subtest, and 10.0 for the auditory closure subtest. Some of the subjects' chronological ages were higher than this, therefore some scores had to be extrapolated.

An arbitrary criterion level of 85% correct was selected for the dichotic listening test.

Summary

According to Butler (Van Hattum, 1980, p. 144), "Recent research does indicate that children whose emotional problems are much less severe than those of the autistic or schizophrenic child also demonstrate auditory-processing problems." In researching this area, lack of empirical evidence was found to support the

above statement. It was the purpose of this study to further investigate this area.

Chapter II

Review of the Literature

According to Butler (Van Hattum, 1980, p. 123), the ability to process auditory information accurately and appropriately is essential to the acquisition of language and to subsequent academic skills. This statement has its exceptions when considering the congenitally deaf children who learn language. Butler states, "Although auditory perception is defined differently by different researchers, there is some consensus that this term refers to the temporal management of auditory input, or the immediate short-term processing of information received aurally" (Van Hattum, 1980, p. 126). Some areas for the evaluation of auditory processing problems are auditory discrimination, auditory sequential memory, auditory closure, and auditory selective attention.

Instruments Used in Prior Research

Auditory discrimination

The most thoroughly investigated aspect of auditory perception has been that of auditory discrimination, the capacity to distinguish between phonemes. The phonetic inventory, a test of speech sound discrimination is the most basic diagnostic tool of the speech therapist, and

much remedial work centers on discrimination of various kinds (Witkin, 1970).

The Wepman Auditory Discrimination Test and Golden-Fristoe-Woodcock Test of Auditory Discrimination were used when comparing the auditory discrimination of normal and learning disabled children (Houck, 1976). Nober and Nober (1975) and McGovern (1976) also used the Wepman when comparing auditory processing of learning disabled with nonlearning disabled children. Liberman, Harris, and Lane (1961) used synthetic speech to investigate discrimination of speech sounds. In a study on the relationship between reading and selected auditory abilities (Flynn and Byrne, 1970), third grade children were asked to discriminate between pairs of words, nonsense syllables, and musical pitches. The Wepman Test of Auditory Discrimination and the Templin Discrimination Test were used.

Auditory sequential memory

Auditory sequencing, the recall of sounds in proper temporal sequence, is necessary for the acquisition of language skills. Words and sentences are made up of a series of sounds presented in temporal order, and this order is a major dimension of language (Witkin, 1970).

In a study comparing auditory functions of good and poor readers, Golden and Steiner (1969) used a subtest of The Illinois Test of Psycholinguistic Abilities to measure

auditory sequential memory, as did McGovern (1976) in a study comparing auditory perception of the learning disabled and the nonlearning disabled. Aten and Davis (1968) investigated the perception, short-term storage, and oral reproduction of serially ordered verbal and nonverbal auditory stimuli by children with minimal or mild cerebral dysfunction. They used the following: non-verbal tests using rhythmic sequencing of tones and duration of tones; and verbal tests which required subjects to repeat nonsense syllable sequences, digits, multi-syllabic words and oral sequences of syllables, and to unscramble sentences composed of random word order. In an experiment undertaken to evaluate auditory, visual, and intersensory functioning of a group of dyslexic boys, (Zigmond, 1969), five measures of auditory memory were used: (a) memory for nonsense syllables, (b) memory for digits--sequences used were adapted from Weschler Memory Scale, digits forward subtest, (c) memory for words; taken from Detroit Tests of Learning Aptitude, auditory attention span for unrelated words subtest, (d) memory for sentences; second subtest from the Detroit, auditory attention span for related syllables, (e) memory for rhythmic sequences.

Auditory selective attention

Attention plays a critical role in learning, and in

recent years, both psychologists and speech scientists have investigated some of its characteristics. No listening can take place without there first being focus and attention to the speech signal (Witkin, 1970).

Most research in the area of attention has used the testing technique of dichotic listening (Broadbent, 1962; Bryden, 1970; DeChristopher, 1978; Leong, 1977; Lerea, 1961; Maccoby and Konrad, 1967; Wahl, 1976). The individual hears two different messages, one in each ear. He is instructed to attend to and comprehend only one of the messages. He is then asked questions about the message to which he was told to attend. In a study conducted by Triesman (1964), the subjects were asked to shadow. In shadowing, you attend to and repeat back continuously what was heard.

Auditory Processing in Relation to Reading

Auditory discrimination

Inaccurate articulation and reading disability may come from a common cause, the inability to successfully discriminate the sounds of words. If a child's auditory discrimination is poor, he may confuse similar words in both speech and reading without recognizing the error. The poor sound discrimination may offer a confusing factor in the formation of associations between words and their visual symbols. The formation of visual-auditory associ-

ations may therefore be complicated through the lack of precision in audition (Monroe, 1932, p.93).

Over the past years clinicians have learned that there is a positive relationship between poor auditory discrimination and poor reading. Also, some findings indicate that when a definite relation between poor articulation and poor discrimination is shown, a relation between poor reading scores and poor discrimination is also shown (Wepman, 1960).

To determine the influence of poor auditory discrimination upon reading defects a group of nonreaders were compared with a group of unselected children (Monroe, 1932, p. 93). The reading defect cases differed significantly from the controls. The controls had fewer errors in auditory word discrimination and had a larger number of successes on a visual-auditory learning test.

Flynn and Byrne (1970) studied auditory abilities of a selected group of advanced and retarded third grade readers from high and low socioeconomic environments. The results showed a significant difference existed between advanced and retarded readers on auditory discrimination tasks.

Auditory sequential memory

Poor memory spans are allied with difficulty in reading and spelling (Saunders, 1931). Lack of precision of

the temporal sequences of sounds may impede progress in reading. The difficulty may be due to poor retention of auditory patterns so that the patterns cannot be held in mind long enough for temporal analysis. The child has difficulty in applying phonics as a method of word recognition. He may be able to give the separate sounds of the letters composing a word, but cannot blend the sounds to get the complete word. He often reverses the sequences of sounds in attempts at blending.

Golden and Steiner (1969) investigated the differences in specific auditory and visual functions between good and poor readers of normal intelligence. Second grade children were used. Results of the auditory testing showed that good readers were significantly superior on the ITPA test of auditory sequential memory.

Cabrini (1963) analyzed the relation of auditory memory span and functional articulatory disorders to reading. One hundred eighty two second grade children were used. The results of the study showed that as reading ability tends to increase, there is a corresponding decrease in the percent of cases which evidence a brevity of auditory memory span. This seems to indicate that brevity of auditory memory span may be a factor which impedes ability to read.

Auditory closure

This is an area of research which seems to be lacking. Only one reference was found pertaining to auditory closure and reading (Golden and Steiner, 1969). The results of this study, previously mentioned under auditory sequential memory, also showed that good readers were significantly superior on the ITPA test of auditory closure.

Auditory selective attention

Where the learner focuses his attention, what cues he selects, whether this attention is directed at the relevant features of the stimuli--these have important implications for reading (Zeaman and House, 1967).

Leong (1977) investigated the dichotic listening paradigm in relation to specific reading disability. Fifty-eight above-average readers (all nine year old males) were used. It was found that disabled readers did not perform as well as controls in overall right ear effect and demonstrated the ineffective use of strategies by disabled readers when they were specifically instructed to report dichotic materials by sides (left/right ear) and types (digits/letters of the alphabet) of stimuli.

A behavior observation schedule was utilized to investigate sex differences in classroom attentiveness, and the relationship of such attentiveness to reading achievement among first grade children, 74 boys and 58 girls (Turnure and Samuels, 1972). Girls were found to be

significantly more attentive than boys and to achieve higher word recognition scores. Also, word recognition was found to be significantly related to attentiveness for the group as a whole with reading readiness controlled.

Summary

The ability to process information aurally is important to the acquisition of academic skills. Some areas for the evaluation of auditory processing are auditory discrimination, auditory sequential memory, auditory closure, and auditory selective attention. Some common testing instruments used are: The Wepman Test of Auditory Discrimination, The Illinois Test of Psycholinguistic Abilities (auditory sequential memory and auditory closure subtests), and dichotic listening tasks.

Research has shown that auditory processing is important to reading achievement. Attentiveness was found to be related to word recognition. Poor sound discrimination may offer a confusing factor in the formation of associations between words and their visual symbols. Poor memory spans may cause difficulty in applying phonics as a method of word recognition.

Chapter III

Design of the Study

Purpose

The purpose of this study was to investigate the statement made by Butler, "Recent research does indicate that children whose emotional problems are much less severe than those of the autistic or schizophrenic child also demonstrate auditory-processing problems" (Van Hattum, 1980, p. 144).

Methodology

Subjects

Sixteen emotionally disturbed children, ages six through eleven, from a residential school for the emotionally disturbed were used as subjects. It was verified by the school nurse that none of the subjects had hearing disorders.

Materials and Procedures

The following tests were used: The Wepman Test of Auditory Discrimination, The Illinois Test of Psycholinguistic Abilities (test of auditory sequential memory and test of auditory closure), and professionally made dichotic listening tapes.

Each test was individually administered to every subject in this order: the Wepman, the ITPA subtests of auditory sequential memory and auditory closure, and the dichotic listening test.

Professionally prepared tapes were designed for the dichotic listening test. A polyester low noise audio tape was used. For this test, the subjects were instructed to listen to the tape through headphones. They were told that they would hear a man's voice in one ear and a lady's voice in the other ear, but to listen only to the lady's voice. The subjects were given three tapes to which they were asked to attend. On each tape, both voices named three colors, instruments, or animals. The subjects were told what category to listen for and to name the colors, instruments, or animals stated by the lady. The passages were taken from a study done by DeChristopher (1978) on the auditory selective attention abilities of children completing a kindergarten program.

The discrimination test was scored according to above average ability, average ability, below average ability, and below the threshold of adequacy. For the auditory sequential memory and auditory closure tests, a psycholinguistic age was computed. The dichotic listening test was scored using an 85% criterion level.

Summary

Sixteen emotionally disturbed children from a residential school were tested in the area of auditory processing. The Weiman Test of Auditory Discrimination, The Illinois Test of Psycholinguistic Abilities (test of auditory sequential memory and test of auditory closure), and a professionally prepared dichotic listening tape were used.

Chapter IV

Findings and Conclusions

Purpose

The purpose of this study was to investigate the statement made by Butler, "Recent research does indicate that children whose emotional problems are much less severe than those of the autistic or schizophrenic child also demonstrate auditory processing problems" (Van Hattum, 1980, p. 144).

Analysis of Data

Table I below contains the subjects' scores in the four areas of auditory processing examined. Only one subject, #8, was found to have auditory processing problems in each of the four areas examined. Conversely, only one subject, #14, was found to have no auditory processing problems in any of the areas. Six subjects, 37.5%, were below in only one area of auditory processing. Four subjects, 25%, were below in two areas, and four subjects, 25%, were below in three areas (See figure 1).

Table 1
Data on the Subjects

Subject	Sex	Chronological age (CA)	Auditory Discrim. Rating	Auditory Seq. Memory *PLA	Auditory Closure PLA	Auditory Selective Attention Percent Correct	No. of Auditory Processing Areas in Which the Subject Fell Below	Medication
			Interpretation	Diff. between PLA and CA	Diff. between PLA and CA			
1.	m.	10.1	0 average ability	7.7 ± .6** 2.0-3.0 below CA	8.5 ± .12 .8-2.8 below CA	55	3	yes
2.	m.	9.8	-1 below average ability	5.0 ± .6 4.2-5.2 below CA	8.5 ± .12 .3-2.3 below CA	100	3	yes
3.	f.	10.4	+1 above average ability	7.2 ± .6 2.8-3.8 below CA	above 10.0 no SE _m available	100	1	yes
4.	m.	10.5	+1 above average ability	above 10.3 no SE _m available	7.3 ± .12 2.2-4.2 below CA	77	2	yes
5.	m.	10.9	+1 above average ability	9.2 ± .6 1.1-2.1 below CA	10.0 ± .12 1.9 below to .3 above CA	88	1	yes
6.	m.	11.0	-1 below average ability	6.6 ± .6 4.0-5.0 below CA	above 10.0 no SE _m available	100	2	no
7.	f.	10.6	0 average ability	7.7 ± .6 2.5-3.5 below CA	10.0 ± .12 1.6 below to .6 above CA	66	2	no
8.	m.	7.7	-2 below adequacy threshold	5.6 ± .7 1.6-2.8 below CA	4.2 ± .11 2.6-4.4 below CA	22	4	no

Table 1 (cont'd)
Data on the Subjects

Subject	Sex	Chronological age (CA)	Auditory Discrim. Rating	Interpretation	Auditory Seq. Memory *PLA	Diff. between PLA and CA	Auditory Closure PLA	Diff. between PLA and CA	Auditory Selective Attention Percent Correct	No. of Auditory Processing Areas in Which the Subject Fell Below	Medication	He To
9.	f.	8.6	-1	below average ability	above 10.3	no SEM available	$9.4 \pm .12$	.2 below to 1.10 above CA	77	2	no	no
10.	m.	9.3	0	average ability	above 10.3	no SEM available	$10.0 \pm .12$	.3 below to 1.9 above CA	77	1	no	no
11.	f.	10.2	0	average ability	$3.10 \pm .6$	5.10-6.10 below CA	$5.3 \pm .12$	3.11-5.11 below CA	44	3	no	no
12.	m.	8.7	0	average ability	$8.8 \pm .7$	.6 below to 1.8 above CA	$7.11 \pm .12$	1.8 below to .4 above CA	55	1	no	no
13.	f.	6.11	-1	below average ability	$6.3 \pm .9$	1.5 below to .1 above CA	$3.4 \pm .10$	2.9-4.5 below CA	44	3	no	no
14.	m.	10.4	0	average ability	$10.5 \pm .6$	.7 below to .5 above CA	$10.0 \pm .12$	1.1 below to .8 above CA	100	0	no	no
15.	m.	10.5	0	average ability	above 10.3	no SEM available	above 10.0	no SEM available	77	1	no	no
16.	m.	9.11	+1	average ability	above 10.3	no SEM available	$6.5 \pm .12$	2.6-4.6 below CA	88	1	no	no
Percent Below			31		50		44		63			

* Psycholinguistic Age

** Standard Error of measurement for the Psycholinguistic Age

Figure 1

Distribution of the Sixteen Subjects by Problem Area

Below in all areas 16.25%	#8
Below in three areas 25%	# 1 - Auditory sequential memory, closure, selective attention # 2 - Auditory discrimination, sequential memory, closure #11 - Auditory sequential memory, closure, selective attention #13 - Auditory discrimination, closure, selective attention
Below in two areas 25%	# 4 - Auditory closure, selective attention # 6 - Auditory discrimination, sequential memory # 7 - Auditory sequential memory, selective attention # 9 - Auditory discrimination, selective attention
Below in one area 37.5%	# 3 - Auditory sequential memory # 5 - Auditory sequential memory #10 - Auditory selective attention #12 - Auditory selective attention #15 - Auditory selective attention #16 - Auditory closure
Below in no areas 16.25%	#14

The majority of the subjects exhibited problems in auditory selective attention. Half of the subjects exhibited problems in auditory sequential memory, and seven of them exhibited problems in auditory closure. The least number of problems were found in the area of auditory discrimination.

Changing the criterion level of the dichotic listening test to 75% would put two more subjects in the below in no areas examined category.

Medication did not seem to have an effect on the performance of those who receive it.

Conclusions

The results demonstrate that not all emotionally disturbed children exhibit auditory processing problems. Most of the subjects did tend to have problems in one or more of the areas examined, but not in all the areas. The majority of the problems occurred in the areas of auditory selective attention, auditory sequential memory, and auditory closure. Few were found in the area of auditory discrimination.

Implications for Research

The area of auditory processing pertaining to the emotionally disturbed is an area which is lacking in research. Further study needs to be conducted in this area.

Since the visual mode is also an important means of learning, research to determine if emotionally disturbed children have visual processing problems could be conducted.

This research study has shown that although not all emotionally disturbed children have auditory processing problems, there is a tendency for a problem to occur in at least one area of auditory processing. An investigation to determine the causes of auditory processing problems in the emotionally disturbed would be beneficial.

An investigation to determine if auditory processing can be improved with instruction and practice might be conducted.

Implications for Classroom Practice

If a child has difficulty processing auditory information, his learning to read will be greatly hindered. A teacher should be aware of such existing problems in his students. If a child is low in auditory discrimination and auditory sequential memory, he will encounter great difficulties in the area of phonics instruction. Lack of precision in discrimination and lack of ability in the temporal sequencing of sounds may affect reading progress. Noise in the classroom increases the possibility that students will miss segments of the teacher's speech. Problems in the area of auditory closure will

make it difficult for the student to integrate the segments heard into a whole message. Therefore, important directions can be misunderstood. Finally, children who are poor in auditory selective attention are unable to focus on the task at hand and to filter out all other extraneous information.

If a teacher is aware of these problems, he could compensate by focusing instruction on other modalities in which the student may be stronger. A program which uses the V.A.K.T. method of teaching reading might be a good technique to use with these students.

Summary

Although not all emotionally disturbed children have auditory processing problems, there is a tendency for a problem to occur in at least one area of auditory processing. Most of the problems fall in the area of auditory selective attention, auditory sequential memory, and auditory closure.

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Appendix A

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 B

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'd)
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 C

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+.