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AN AUDIOMETRIC ANALYSIS OF THE  
STUDENT POPULATION OF THE  
MONTANA STATE SCHOOL FOR THE DEAF

by

PEGGY TROWER KENNA

B.A. Montana State University, 1958

Presented in partial fulfillment of the requirements  
for the degree of Master of Arts

MONTANA STATE UNIVERSITY

1960

Approved by:

  
Chairman, Board of Examiners

  
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## CHAPTER I

### INTRODUCTION

Speech has always been considered a universal means of communication and sound the prime vehicle for speech. Historically those individuals deprived of normal hearing have been considered incapable of utilizing this means of communication. They have been considered "deaf" and therefore, "dumb."

However, there have been occasional dedicated individuals who have attempted to make the world of sound meaningful to those with an auditory handicap. Observed success with these handicapped individuals was rare, and those who did acquire some of the benefits of speech and a utilization of sound from a so-called "acoustic method" achieved this from long and tedious effort. Because of the absence of any method of ascertaining the magnitude of hearing loss it was impossible to know if these persons were enabled to learn speech and language by utilization of auditory cues of which they were being made aware, or if they were learning only from visual and kinesthetic cues.<sup>1</sup>

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<sup>1</sup>Hallowell Davis, Hearing and Deafness (New York: Rinehart and Company, 1957), pp. 341-348.

Many teachers of the deaf and hard of hearing began teaching their students an oral method but because of the many difficulties encountered on the part of both the teacher and the students, this method was frequently abandoned. The "manual method," which was easily learned and understood, would then be resorted to so that education of these handicapped individuals could proceed more quickly.<sup>2</sup> The "manual method" was used then as it is today for the following reasons:

1. Sign language or the manual alphabet is much easier to learn and is learned more quickly than oral communication.

2. Manualism was and is a widely accepted means of communication among the deaf and others who are familiar with it.

3. Educators sometimes felt that too often the results of exclusively oral training developed language that was often stilted and imperfect. This language was therefore difficult to understand by untrained listeners.

4. Early educational philosophy of the deaf and severely hard of hearing stressed that the time spent developing oral communication could be used to a better advantage in developing the child's mental capacities.

5. There was the assumption that the deaf person

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<sup>2</sup>Ibid., pp. 349-351.



associated with the deaf and therefore there was little need to learn oral communication.<sup>3</sup>

There has been a general acceptance, up to the first quarter of the twentieth century, that the most practical means of rehabilitation and education of the deaf and hard of hearing was through use of the manual or combined manual and oral methods.<sup>4</sup>

In the early 1930's, primarily due to the advent of the vacuum tube, the hearing aid was developed, introducing a practical way of aiding those interested in advancing the oral method of communication for the deaf and hard of hearing.<sup>5</sup> Other advances that have aided this method are the pure tone audiometer and the speech audiometer.<sup>6</sup> These instruments have replaced subjective tests of measuring hearing loss and provide an accurate way of measuring an individual's hearing acuity.<sup>7</sup> Through the use of electrical amplification an attempt to overcome the amount of hearing loss was made. This has become a positive and important means of aiding the deaf and hard of hearing as

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<sup>3</sup> Ibid., p. 370.

<sup>4</sup> Ibid. pp. 371-372.

<sup>5</sup> Hays Newby, Audiology (New York: Appleton-Century-Crofts, 1938), p. 234.

<sup>6</sup> Ira J. Hirsh, The Measurement of Hearing (New York: McGraw Hill Book Co., 1952), pp. 71-74, 81-83.

<sup>7</sup> Ibid.

the world of sound could now become meaningful.<sup>8,9</sup>

The point of view maintained by the advocates of the oral method of rehabilitation for the deaf and hard of hearing has been strengthened by the use of amplification. These are the reasons cited by some educators for teaching a child oral communication:

1. There is no need for the child to live just among a deaf population in that speech can be taught to the child so that he can live among a normal population.<sup>10</sup>

2. The oralist sees the child as he sees essentially all deaf or hard of hearing children, in that he is normal and thus is capable of producing a variety of sounds.<sup>11</sup>

3. Training a child to use speech and oral communication gives the child a better opportunity to adjust to a world in which the chief medium of communication is oral.<sup>12</sup>

4. Vocational rehabilitation is more likely because employers are more willing to hire people with whom they can communicate effectively.<sup>13</sup>

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<sup>8</sup>Alice Streng, Hearing Therapy for Children (2nd ed., New York: Grune and Stratton, 1958), pp. 127-129.

<sup>9</sup>Newby, op. cit., p. 274.

<sup>10</sup>Davis, op. cit., p. 373.

<sup>11</sup>LeRoy D. Hedgecock, "Speech and Hearing Problems of the Young Deaf Child," American Annals of the Deaf, Vol. 100 No. 5 (November 1955), p. 437.

<sup>12</sup>Davis, op. cit., p. 372.

<sup>13</sup>Ibid.

5. The child who can communicate orally is less likely to be evaluated as a handicapped individual, and therefore is more likely to be judged for his own individual assets and liabilities.<sup>14</sup>

This position has been strengthened and supported by the positive results achieved in various experimental studies over the past ten years. Research studies using oral methods with and without amplification in teaching severely hard of hearing children have been done in England by Ewing and Whetnall,<sup>15</sup> by Wedenberg in Sweden,<sup>16</sup> Bellevue Hospital in New York City, the HEAR Foundation in Los Angeles,<sup>17</sup> The Clarke School for the Deaf<sup>18</sup> and the staff of the John Tracy Clinic in Los Angeles.<sup>19</sup> The results of these studies have supported the view that children, even with profound losses, can be taught oral

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<sup>14</sup>Streng, *op. cit.*, p. 2.

<sup>15</sup>A. W. G. and Irene R. Ewing, "Educational Treatment of Deafness," The Lancet, Vol. 2 No. 253, (London: The Lancet Limited), pp. 628-630.

<sup>16</sup>Erik Wedenberg, "Auditory Training of Deaf and Hard of Hearing Children," Acta-Otolaryngology Supplement, Vol. 94, (1951).

<sup>17</sup>Maja Bernath, "The World for Deaf Babies," Parents Magazine (February 1959), pp. 48-50, 74-76.

<sup>18</sup>The Clarke School for the Deaf, Eighty-ninth Annual Report (Northampton, Mass.: Gazette Printing Co., Inc., 1956), pp. 61-62.

<sup>19</sup>Newby, *op. cit.*, pp. 260-62.

communication successfully by using the visual, kine-  
sthetic, and amplified auditory cues.

It is realized by many educators of the deaf and  
hard of hearing that every child should have the oppor-  
tunity to learn speech.<sup>20</sup> The question is often raised  
as to which child can profit most from a type of program  
that includes auditory training and amplification. Per-  
haps the answer to this question has best been summed up  
by Myklebust,<sup>21</sup> who considers the prognosis best for the  
child who exhibits the following characteristics:

1. General alertness and response to loud sounds  
without amplification.
2. Compensation in uses of the other remaining  
senses.
3. Behavior that is considered to fall within the  
normal continuum.
4. Mental capacity that falls within the average  
range.
5. Social maturity that is rated average, except  
for the communication area.
6. Motor capacity that shows no general inco-  
ordination nor retarded responses.

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<sup>20</sup>Hedgecock, op. cit., pp. 435-440.

<sup>21</sup>Helmer Myklebust, Auditory Disorders in Children  
(New York: Grune and Stratton, 1954), p. 352.

7. Language that includes some use of voice, gesture and behavior.

8. An emotional adjustment that includes a positive response to people through social and environmental contacts.

Individuals with the above attributes represent the ideal, but that does not mean that the child with little or no residual hearing cannot profit from auditory training.<sup>22</sup> Since 97 per cent of the aurally handicapped in the United States have some residual hearing, amplification and auditory training and their possibilities should be considered in any rehabilitation program for this group.<sup>23</sup> A program that utilizes amplification in conjunction with teaching oral communication gives the child the necessary tools that enable him to express himself verbally and to understand the words and thoughts of others that are spoken to him.

In the past it was assumed that there was a high correlation between the results of oral methods of training and the type and degree of hearing loss. The child

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<sup>22</sup>Hedgecock, op. cit., pp. 443-444.

<sup>23</sup>The Deaf and the Deafened in America, An Economic Survey Prepared for the Committee on Conservation of Hearing of The American Academy of Ophthalmology and Otolaryngology (New York: Tamblin and Brown, Incorporated, August, 1951), pp. 29-30.

with no usable hearing cannot be expected to attain normal speech, although it is possible to help this child to develop language that is reasonably intelligible.<sup>24</sup> Hopkins and Hudgins in a recent study report that it is their belief that all acoustically handicapped children seem to derive some benefit from periods of auditory training with amplification.<sup>25</sup> It is important to note the role that individual differences play in the training of children to communicate orally and to benefit from amplification.<sup>26</sup>

Because of the complexity of the problem, the educational possibilities for the deaf and hard of hearing child are widely varied according to facilities, financial resources and philosophies of persons involved.<sup>27</sup> Theoretically, educational placement for the acoustically handicapped child can be made primarily in accordance to the amount of residual hearing the child has. There are numerous ways of classifying hearing loss. A widely used classification is the one suggested by Streng.<sup>28</sup>

1. Mild Loss: 20-30 db. (i.e., decibel). This

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<sup>24</sup>Davis, op. cit., p. 380.

<sup>25</sup>Streng, op. cit., p. 171.

<sup>26</sup>Hedgecock, op. cit., pp. 435-440.

<sup>27</sup>Streng, op. cit., p. 180.

<sup>28</sup>Ibid., pp. 164-165, 172.

child can fit into a normal school system.

2. Marginal Loss: 30-40 db. This child will fit into the public school, but will need some speech and auditory training.

3. Moderate Loss: 40-60 db. If the public school has special class placement, this child will fit in. Auditory training and speech training are necessary.

4. Severe Loss: 60-65 db. A special class for the handicapped is necessary for this child. Auditory training and speech training are necessary.

5. Profound Loss: 65 db. and beyond. This child will not learn language spontaneously, so will need a special program to develop speech and language. A special school or class is necessary for this child.

If the above classification and educational placement of the auditorily handicapped children were to be accepted it would follow that the ideal would be to place all but possibly the profoundly hard of hearing child in a regular school. The rationale for the above is: 1) It provides a more normal experience and environment for the child and, 2) This type of education costs society less than that of a special school. Norton Canfield, M.D., has stated that it is better to have the child in a regular school where there is opportunity for special help in auditory and speech training, than it is to send the child to a school for the deaf. Dr. Canfield feels

that the latter school is only for the profoundly deaf and hard of hearing.<sup>29</sup> Dr. Canfield's position is supported by Dr. G. V. Hudgins, research director of the Clarke School for the Deaf. Dr. Hudgins states that because of the good prognosis for children having mild and moderate losses for succeeding in regular schools, a cut-off point for acceptance of children in schools for the deaf should be made with respect to their hearing acuity.<sup>30</sup> He states that although such a rule cannot be mandatory, a child with a hearing loss for speech of less than 55 db. is not typically a candidate for placement in residential schools for the deaf.

#### Statement Of The Problem

It seems evident that the amount of residual hearing that a child has should be considered to be one of the pertinent factors involved in making the decision as to the most suitable educational placement of the deaf and hard of hearing. Theoretically, only the children with severe and profound hearing losses would be considered to be candidates for placement in residential schools for the deaf.

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<sup>29</sup>The Deaf and Deafened in America, op. cit., p. 29.

<sup>30</sup>C. V. Hudgins, "Speech and Speech Perception," Volta Review, Vol. 55 (January 1953), pp. 20-35.



For purposes of this investigation this author wanted to classify the hearing loss of students attending Montana State School for the Deaf in order to determine if amount of hearing loss in this particular student population would be consistent with the above-mentioned criterion. Therefore, with the permission of Mr. Glenn Harris, Superintendent of Montana State School for the Deaf and Blind, a pure tone audiometric evaluation was performed on each child enrolled in the deaf division of the school for the academic year of 1958-59.

## CHAPTER II

### PROCEDURE

The purpose of this study was to assess the auditory acuity of all of the students enrolled in the Deaf Department of the Montana State School for the Deaf and Blind for the academic year of 1958-59. The assessment was accomplished through the administration of individual pure tone threshold audiometric tests. After determination of a subject's hearing acuity, the individual's audiogram was classified as to degree of loss for speech. Hearing loss for speech for each individual was determined by taking the average decibel loss of the better ear for the frequencies of 500, 1000, and 2000 cps. (i.e., cycles per second).<sup>31,32</sup> The hearing loss for speech was then categorized, according to accepted procedure, into the classifications of mild, marginal, moderate, severe, and profound.<sup>33</sup> The subjects consisted of 64 students;

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<sup>31</sup>Hirsh, op. cit., pp. 148-149.

<sup>32</sup>R. Carhart, "Speech Reception in Relation to Pattern of Pure Tone Loss," Journal of Speech Disorders, Vol. 11 (June 1946), pp. 103-106.

<sup>33</sup>Newby, op. cit., p. 216.

30 male and 34 female. The ages ranged from six years to twenty years.

The audiological procedure consisted of the administration of individual pure tone threshold tests to each individual for the following frequencies: 250-500-1000-2000-4000, and 8000 cps. Standard audiometric testing procedures were used.<sup>34,35</sup> Clinical masking was introduced for air conduction testing if a child was found to have a difference of 30 db. between ears at any frequency.<sup>36</sup>

Each subject was given a minimum of two pure tone threshold tests.<sup>37</sup> The second test was administered seven days after completion of the first test. Whenever there was a discrepancy between the first and second test, or whenever results were considered to be unreliable, a third test was administered. This test was given ten days after completion of the second test.

In all cases where there was a discrepancy between the first and later tests, the last test was considered to be the most reliable measure of the individual's hearing

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<sup>34</sup>Hirsh, op. cit., pp. 112-114, 263-275, 283-286.

<sup>35</sup>R. Carhart and James F. Jerger, "Preferred Method for Clinical Determination of Pure Tone Thresholds," Journal of Speech and Hearing Disorders, Vol. 24 No. 4 (November 1959), p. 331.

<sup>36</sup>Hirsh, op. cit., pp. 175-177.

<sup>37</sup>Ibid., P. 105.

acuity. These final results were obtained after extensive conditioning and rechecking, and after the individual's threshold stabilized at a given intensity level on at least two consecutive trials. The data from this final audiogram were used to determine the "hearing loss for speech." This loss was then used to categorize the individual's hearing loss according to the Streng classification.<sup>38</sup> In all cases the data for the better ear were utilized in the categorization as this typically would be the ear that would respond most effectively for auditory training purposes for the individuals with losses of this degree.<sup>39</sup>

Testing was conducted in rooms at the School for the Deaf that were selected for low ambient noise level. These rooms were not ideal for audiometric testing, but the noise that was present was not felt by the experimenter to affect the testing of this population of "deaf" students.

Equipment used consisted of a Maico-model H-1 audiometer and a Maico-model F-1 audiometer. Both instruments meet the specification for pure tone audiometers of the Council on Physical Medicine and Rehabilitation of

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<sup>38</sup>Streng, loc. cit.

<sup>39</sup>Newby, op. cit., p. 101.

the American Medical Association<sup>40</sup> and the American Standards Association.<sup>41</sup> Both instruments used were factory calibrated within six months prior to the testing period. Immediately prior to using these instruments at the School for the Deaf and Blind, live ear calibration was performed. After the testing was completed, another live ear calibration was performed using the same procedure.<sup>42</sup> Both audiometers were in calibration as determined by this method prior to, and following, the administration of the pure tone audiometric test at Montana State School for the Deaf.

An attempt was made to assess inter-tester reliability. Audiograms were obtained on a randomly selected 25 per cent sample of the experimental group by another trained audiologist. These audiograms were obtained after subjects had received at least two hearing tests by the experimenter. This audiologist worked independently with each individual until he felt that the subject was satisfactorily trained to the audiometric task. Using essentially the same technique as the experimenter he

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<sup>40</sup> Journal of the American Medical Association, Vol. 146 No. 3 (May 19 1951), pp. 255-257.

<sup>41</sup> American Standards Association, "American Standards Specification for Audiometers for General Diagnostic Purposes" (American Standards Association Z24.5-1951, approved March 21, 1951).

<sup>42</sup> Newby, op. cit. pp. 86-87.

obtained a pure tone threshold test for each of the selected subjects. Location and conditions were the same for the administration of these tests for this audiologist as they were for the experimenter. Correlational analyses were performed for the audiological results of the two examiners. Each examiner's classification of the individual's degree of hearing loss for speech was also used as a further comparison of inter-tester reliability.

## CHAPTER III

### RESULTS AND DISCUSSION

Individual pure tone threshold tests were administered by the audiologist to 64 children, 30 male and 34 female. Clinical masking was used in the testing of these subjects. All children received at least two pure tone threshold tests, with a lapse of seven days between tests. Seven children were given a third test. (See Appendix A)

Using the results of the last test in each case, the audiograms were then classified according to the amount of hearing loss as suggested by Streng.<sup>43</sup> This classification is similar to other classifications found in the literature.<sup>44</sup> Results of this classification revealed that four subjects had mild (20-30 db.) losses, two had marginal (30-40 db.) losses, eight had moderate (40-60 db.) losses, three had severe (60-65 db.) losses, and 47 had profound (65-100 db.) losses. (See Table I)

Seventeen children were tested an additional time by another audiologist in an effort to determine inter-

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<sup>43</sup>Streng, loc. cit.

<sup>44</sup>Newby, op. cit., p. 216.

Table I

Classification of Hearing Loss for Speech\* of the  
Better Ears for Sixty-four Students Enrolled in Deaf  
Division of Montana State School for the Deaf and Blind

Mild 20-30 db.	Marginal 30-40 db.	Moderate 40-60 db.	Severe 60-65 db.	Profound 65-100 db.	Total
4	2	8	3	45	62

\*Alice Streng, Hearing Therapy for Children (2nd ed., New York: Grune and Stratton, 1958), pp. 127-129.



tester reliability. (See Appendix B) In the evaluation of inter-tester reliability, a reliability coefficient was computed for each ear comparing the mean loss for all the test frequencies. For the right ears, the reliability coefficient was .76, and for the left ears, it was .83. The coefficient for the combined right and left ears was .78. It is recognized that these coefficients of reliability were not extremely high. However, in light of the individuals tested, the difficulties in communication and the lack of any previous experience of this kind for most of these subjects, it was felt that this inter-tester reliability was sufficient for this study. This reliability was further evaluated. Classification of severity of hearing loss for speech for these same subjects was compared. (See Table II) The results indicate that the two audiologists placed the hearing losses of twelve of the subjects in the same categories. Three of the subjects were placed in adjacent categories. Results of two tests were not included as it appeared to both audiologists that they were too inconsistent to be utilized. Of the 64 subjects tested, only these two audiograms were felt to be invalid, and the data from these were not utilized in any aspect of this study. It happened by chance that these subjects were tested by both examiners.

Table II

Comparison of the Classification of Average Hearing Loss of Better Ears\* Randomly Selected from School Population. This Data was Obtained by the Writer and Another Qualified Audiologist

	Mild 20-30 db.	Marginal 30-40 db.	Moderate 40-60 db.	Severe 60-65 db.	Profound 65-100 db.	To- tal
PK		1	1	2	11	15
CP	1		2	2	10	15

\*Streng, loc. cit.

The initial tests were not used by the audiometrist to ascertain hearing acuity. A number of factors, other than auditory acuity, were involved in testing. The most significant of these was the language barrier. As most of these children do not understand speech nor do they use oral communication, the audiologist had to interpret to each subject how to respond to the test. Sometimes a child who understood oral communication would interpret for the other children by using sign language. Very few of these children indicated that they were familiar with audiometric testing; therefore, there was a problem in conditioning the child to respond to this particular task. First the child had to understand what he was to listen for, then he had to understand how he was expected to indicate a response. For these reasons, the initial examination was quite lengthy and the audiometric test was considered to be exploratory and of a conditioning nature.

It was noted by the audiometrist that these children, in an apparent effort to do what was expected of them, made active use of any visual cues available in order to know when to respond. The audiologist took special care when testing, to make sure visual cues were not available to the subject.

Some of the children were recognized by the school personnel as being mentally retarded or as being cerebral

palsied. Difficulty was encountered in the evaluation of responses of these children.

However, with the exception of the two previously mentioned subjects, by the end of the third test, all of them were felt to be conditioned satisfactorily and results were considered to be reliable measures of their hearing acuity. This seems to be verified by the results of the inter-tester reliability measures. On the basis of this information it was assumed that the data of this study would not vary significantly if obtained by other trained audiometrists, testing under comparable conditions.

#### Discussion

Until very recently, children who did not talk were considered deaf (i.e., no usable hearing), and therefore potential candidates for the schools for the deaf. Many schools for the deaf today are still using the technique of admitting a child who does not talk, on a trial basis, and then if he behaves as the other children who are classified as deaf, he is evaluated by the teachers as a child who is educatable within their system.<sup>45</sup> Evidence accumulated in both the natural and behavior sciences

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<sup>45</sup>Margaret S. Kent, "Administrative Procedures Concerning Admission of New Students to Residential Schools for the Deaf," American Annals of the Deaf, Vol. 104 No. 3 (May 1959), pp. 271-276.

reveal that there can be reasons, other than auditory impairment, that can contribute to the child's failure to acquire speech normally.<sup>46,47,48</sup> Children whose behavior resembles that of the hard of hearing or deaf child includes those who are mentally deficient, those who have suffered traumatic emotional experiences, brain damaged children and children who are cerebral palsied.<sup>49,50,51</sup>

Children who are mentally deficient sometimes fail to acquire speech, not because of an auditory handicap, but because they are generally limited in mental ability. Their language development must be measured in terms of their intellectual capacities.<sup>52</sup> Language retardation can occur when environmental conditions are such that the child does not get the stimulation needed to develop speech or where the motivation to communicate is in some way deterred. Severe emotional trauma can also deter the development of speech. The child in this latter case may

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<sup>46</sup>Myklebust, op. cit., p. 15.

<sup>47</sup>Kent, op. cit., pp. 271-273.

<sup>48</sup>The Deaf and Deafened in America, op. cit., pp. 10-19.

<sup>49</sup>Myklebust, op. cit., pp. 17-30.

<sup>50</sup>Kent, loc. cit.

<sup>51</sup>Hedgecock, op. cit., pp. 437-439.

<sup>52</sup>Myklebust, op. cit., pp. 218-235.

reject sound emotionally as being associated with conflict or unpleasantness.<sup>53</sup> This condition may result in a language disorder. It is more than just an inability to speak, but may be considered a disorder in symbolic functioning.<sup>54</sup>

The cerebral palsied child will often have a true organic hearing loss, and sometimes language fails to develop normally. However, this may not be because of a hearing loss in all cases, but because the child may be unable to use the muscles that are required to produce adequate speech or because of environmental restrictions.<sup>55</sup>

Since a child's lack of speech can sometimes be traced to factors other than auditory deficiency, it seems necessary that the child be evaluated carefully before classifying him as a candidate for a residential school for the deaf. Of the 72 public residential schools in the United States, 55 are making available the services of an audiometrist to evaluate hearing loss, 45 are using the services of an otologist, 16 have the services of a psychiatrist, and 44 are using the services of a

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<sup>53</sup>Ibid., pp. 182-216.

<sup>54</sup>Kent, op. cit., p. 272.

<sup>55</sup>Ibid.

psychologist.<sup>56</sup> The initial evaluation of the child is recommended to be done using a team approach. The audiologist and otologist would be the first team members to examine and test this child to determine amount, degree, and type of hearing loss. Further examinations would be directed through these two members. Ideally other team members would include a pediatrician, psychiatrist, psychologist and an educator of the deaf. Since the evidence indicates clearly that early diagnosis is pertinent to successful rehabilitation of the child with auditory impairment,<sup>57</sup> this team would examine the pre-school child as well as the child who is within the age group eligible for admission to the school for the deaf. Success in early and adequate language development, and therefore, education, is easier and more probable if the child is diagnosed as soon as behavior indicates the possibility of having a hearing loss.<sup>58</sup> When the team approach is used in evaluating a child's behavior, the educator should be responsible for coordinating and utilizing this information to provide guidance in determining an

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<sup>56</sup>Powrie Vaux Doctor, Editor, "Tabular Statement of American Schools for the Deaf," American Annals of the Deaf, Vol. 104 No. 1 (January 1959), p. 125.

<sup>57</sup>Grace Montague, "The Deaf Baby," What's New, No. 212 (Summer 1959), p. 4.

<sup>58</sup>Wedenberg, loc. cit.

effective educational program.

The services of consulting specialists have been employed in some states rather than using a specific team.<sup>59</sup>

It is estimated that 99 per cent of the auditorily handicapped acquire their hearing losses after birth.<sup>60</sup> In this group, it is estimated by the United States Public Health Service that nearly 75 per cent of these hearing losses occur before the age of five, and that nine out of ten cases occur before the age of twenty. With the advances made in medicine and conservation of hearing programs there has evolved a general awareness by the public of the needs of this group. The necessity of early diagnosis and classification of hearing loss has been recognized as the single most important initial step in rehabilitation of the auditorily handicapped individual. Twenty-one states are now requiring hearing tests of all school age children.<sup>61</sup>

Facilities for rehabilitation and education of the deaf and hard of hearing population vary for each state.

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<sup>59</sup>Kent, op. cit., p. 273.

<sup>60</sup>Charles E. Kinney, M.D., "Deafness," The Encyclopedia Americana (1957 Edition), Vol. VIII, p. 531.

<sup>61</sup>Doctor, loc. cit.



Some states have begun to incorporate the education of these children into their public school systems. An example of such a state program is Washington, where state special education funds have been allocated to each school district to provide for the acoustically handicapped. The hard of hearing children attend public day schools for the deaf where they are taught oral communication, and when they are academically ready, classroom work is instigated. This educational program is comparable to that of other public schools. If the child is able to use aural communicative skills successfully and has the personality and academic ability, he is integrated into the classes of normal hearing children, where he receives daily work in speech and lip reading and remedial school work in academic subjects if needed. At present this system is being successfully employed in the more heavily populated areas.<sup>62,63</sup> The State also maintains a state supported residential school for the care and education of those children who are unable to fit into the special education plan within the public school

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<sup>62</sup> Letter from Roy Howard, Executive Director of Special Education, Seattle Public Schools, Administrative and Service Center, 815 Fourth Ave. North, Seattle 9, Washington, to Peggy Trower Kenna, November 23, 1959.

<sup>63</sup> Letter from Jo D. Watts, Edna E. Davis School, 1723 W. Seventh Avenue, Spokane 43, Washington, to Peggy Trower Kenna, November, 1959.

system.<sup>64</sup> This State is not unique in its special education facilities for these handicapped individuals. There are now twenty-seven states that have public day schools and classes for the acoustically handicapped.<sup>65</sup>

Since there are no special day schools or other facilities that accommodate the acoustically handicapped within the school districts in Montana, those who are suspected of being deaf and hard of hearing must acquire their education and rehabilitation either by going out of state or by attending the Montana State School for the Deaf and Blind. This is a public residential school, located in Great Falls, which "is open for all children in the State between the ages of six and twenty-one, too deaf or too blind to attend the public schools, and who are of sound mind and free from chronic disease as would prevent study." (Application for admission blank from the Montana State School for the Deaf and Blind. See Appendix C.)

Montana's public residential school has been designed to provide educational and vocational training for the profoundly hard of hearing or "deaf" children within this State. Certainly the function that this

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<sup>64</sup>Doctor, loc. cit.

<sup>65</sup>Ibid., 130-141.

institution fulfills is needed and should be retained, but it should be recognized that since all the acoustically handicapped children within this state do not belong in the classification of profoundly hard of hearing or "deaf," their needs must also be considered.

It has been previously pointed out that effective evaluation of all children suspected of being acoustically handicapped should be the first step in rehabilitation. Montana should recognize this need and either develop a team approach, such as has been utilized in the care of the cleft palate population of the State,<sup>66</sup> or use the services of consulting specialists.

Since this is a rural state, the most realistic solution for most acoustically handicapped children who are not profoundly hard of hearing or "deaf" would be the instigation of special classes within the school systems for these particular children. As in Washington, state special education funds could be utilized to provide for hiring teachers who are trained to the particular task of rehabilitation of the aurally handicapped whose losses range from mild to severe. These children would then be taught language and speech, using

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<sup>66</sup>Statement by LeRoy Aserlind, Coordinator, Montana Cleft Palate Team, Montana State Board of Health, Helena, Montana, personal interview.

an oral method that would enable them to compete adequately in a normal hearing society.

## CHAPTER IV

### SUMMARY AND CONCLUSIONS

The purpose of this study was to obtain an audiometric evaluation of the hearing acuity of each student in the deaf division of the Montana State School for the Deaf and Blind for the academic year 1958-59.

Individual pure tone threshold tests were administered to each student and these results were then used to classify the individual's hearing loss into the following categories: mild, marginal, moderate, severe, or profound. Using a criterion of a minimal 60 decibel hearing loss in the better ear as the basis for placement, 14 of those students tested were found not to have sufficient hearing loss to warrant placement in a public residential school for the deaf.

#### Conclusions

The data suggest the following conclusions:

1. Most of the students in the deaf division of the Montana State School for the Deaf and Blind did not appear to be familiar with pure tone audiometric testing.
2. Fourteen of the students tested did not meet

the recommended criterion of having "severe" or "profound" hearing loss, typically considered to be a prerequisite for admittance to a public residential school for the deaf.

3. Fifty individuals tested had severe and profound hearing losses.

4. Twenty-five per cent of this population were retested by another audiologist. The audiometric results were comparable, as the inter-tester reliability measures verified. It seems realistic to assume that the data of this study would not differ significantly if obtained by another audiologist, testing under comparable conditions.

5. This study indicates that a thorough hearing evaluation of all candidates for the school for the deaf is needed.

6. A re-evaluation of the State's responsibility toward the hearing handicapped group who do not meet the criterion of profoundly hard of hearing or deaf is also indicated.

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## APPENDICES

APPENDIX A

Individual Pure Tone Audiometric Test Results  
of Sixty-four Children Enrolled in the  
Deaf Division of the Montana State School for  
the Deaf and Blind

Frequency	250		500		1000		2000		4000		8000	
Ear	R	L	R	L	R	L	R	L	R	L	R	L
Subject 1	45	80	60	90	75	90	70	NR	70	NR	NR	NR
2	60	65	80	70	90	80	95	85	80	90	NR	NR
3	NR	NR	95	NR	95	NR	NR	NR	NR	NR	NR	NR
4	65	50	75	70	100	90	NR	NR	NR	NR	NR	NR
5	NR	80	NR	90	NR	100	NR	NR	NR	NR	NR	NR
6	-5	0	15	20	60	50	65	55	60	50	55	45
7	50	25	50	30	85	50	85	30	NR	35	NR	55
8	25	35	30	55	55	65	60	80	70	NR	50	NR
9	75	60	90	80	NR	80	NR	NR	NR	NR	NR	NR
10	20	15	25	25	25	25	25	25	20	20	15	15
11	60	55	65	65	80	85	90	85	NR	NR	NR	NR
12	30	45	50	60	75	75	85	80	90	90	NR	NR
13	60	60	80	70	90	95	90	100	NR	NR	NR	NR
14	75	30	85	50	90	70	NR	70	NR	NR	NR	NR
15	65	55	75	70	75	80	NR	90	NR	NR	NR	NR
16	65	60	80	80	NR	NR	NR	NR	NR	NR	NR	NR
17	35	50	55	50	65	70	70	75	NR	NR	NR	NR
18	65	65	90	90	100	100	NR	NR	NR	NR	NR	NR
19	75	75	95	90	90	85	90	90	95	95	NR	NR
20	65	75	95	85	95	90	NR	NR	NR	NR	NR	NR
21	60	60	75	70	85	70	95	60	NR	60	NR	50
22	75	75	90	80	100	100	NR	NR	NR	NR	NR	NR

Frequency	250		500		1000		2000		4000		8000	
	R	L	R	L	R	L	R	L	R	L	R	L
Subject 23	75	65	85	95	100	95	NR	90	NR	NR	NR	NR
24	80	60	NR	75	NR	90	NR	NR	NR	NR	NR	NR
25	85	NR	90	NR	100	90	95	NR	NR	NR	NR	NR
26	NR	80	90	85	85	95	NR	NR	NR	NR	NR	NR
27	55	60	65	75	85	90	90	NR	NR	NR	NR	NR
28	65	70	85	85	NR	90	NR	NR	NR	NR	NR	NR
29	55	55	60	75	75	75	85	85	75	85	80	NR
30	65	65	90	70	100	95	NR	NR	NR	NR	NR	NR
31	35	55	60	70	85	85	NR	NR	NR	NR	NR	NR
32	55	55	75	65	85	85	NR	NR	NR	NR	NR	NR
33	5	15	20	15	30	30	40	40	40	45	55	55
34	15	5	20	15	15	25	45	35	75	65	60	70
35	45	50	55	65	60	70	65	75	65	75	70	65
36	15	40	25	35	30	40	30	55	NR	50	NR	60
37	55	25	35	35	65	35	65	35	55	30	65	30
38	65	60	95	85	100	100	NR	NR	NR	NR	NR	NR
39	65	60	75	75	NR	95	90	95	80	NR	NR	NR
40	40	30	35	35	55	45	50	NR	55	NR	65	NR
41	70	70	80	80	95	90	95	95	NR	NR	NR	NR
42	30	25	50	45	60	45	60	50	60	50	55	60
*43	15	35	35	40	NR	70	NR	NR	NR	NR	NR	NR
*44	70	45	80	70	95	85	NR	75	NR	75	NR	65

Frequency	250		500		1000		2000		4000		8000	
	R	L	R	L	R	L	R	L	R	L	R	L
Subject 45	65	75	80	85	100	100	NR	NR	NR	NR	NR	NR
46	65	55	80	70	85	80	80	75	80	65	NR	60
47	0	0	15	5	65	65	55	65	60	75	NR	75
48	55	55	85	85	100	100	NR	NR	NR	NR	NR	NR
49	40	35	65	55	80	85	95	90	NR	NR	NR	NR
50	35	35	55	50	65	75	65	85	90	85	NR	80
51	75	60	85	85	100	NR	NR	NR	NR	NR	NR	NR
52	55	50	65	60	80	85	95	90	NR	NR	NR	NR
53	50	60	65	75	70	75	NR	NR	NR	NR	NR	NR
54	60	70	80	75	100	100	NR	NR	NR	NR	NR	NR
55	75	75	85	85	NR	95	NR	NR	NR	NR	NR	NR
56	NR	80	NR	90	NR	100	NR	NR	NR	NR	NR	NR
57	35	20	70	40	90	80	NR	NR	NR	NR	NR	NR
58	70	55	80	65	90	85	90	NR	NR	NR	NR	NR
59	45	35	55	50	85	70	80	75	NR	70	NR	65
60	55	75	65	80	80	95	85	NR	NR	NR	NR	NR
61	60	65	75	75	85	85	100	95	NR	NR	NR	NR
62	55	50	75	80	90	85	NR	NR	NR	NR	NR	NR
63	65	45	75	70	95	80	95	95	NR	NR	NR	NR
64	55	60	75	65	85	80	80	85	90	85	NR	NR

NR - No measurable response.

\* - These data were considered unreliable and were not used in this study.

APPENDIX B

Pure Tone Audiometric Evaluation of  
Twenty-five Per Cent of Student Population  
in the Deaf Division of the  
Montana State School for the Deaf and Blind  
by an Independent Audiologist

Frequency	250		500		1000		2000		4000		8000	
	R	L	R	L	R	L	R	L	R	L	R	L
Subject 9	NR	60	NR	80	NR	80	NR	NR	NR	NR	NR	NR
10	30	50	30	55	35	50	35	45	25	50	15	35
11	60	50	65	70	80	80	90	85	NR	NR	NR	NR
12	45	55	45	55	75	80	85	85	NR	NR	NR	NR
13	70	60	80	85	90	95	NR	NR	NR	NR	NR	NR
14	70	35	80	55	95	75	NR	80	NR	NR	NR	NR
15	55	50	60	55	55	80	70	95	NR	NR	NR	NR
16	75	75	80	80	NR	95	NR	NR	NR	NR	NR	NR
17	40	50	60	60	70	70	65	70	NR	NR	NR	NR
38	30	75	40	80	35	NR	40	NR	NR	NR	NR	NR
39	60	60	70	60	80	70	70	65	70	70	NR	NR
40	65	NR	75	NR	85	NR	NR	NR	NR	NR	NR	NR
41	NR	NR	90	85	95	95	95	NR	NR	NR	NR	NR
42	25	30	40	35	50	50	60	50	50	65	60	70
*43	50	50	55	50	60	60	70	70	NR	90	NR	NR
*44	75	45	80	65	95	85	80	80	NR	80	NR	75
45	65	65	80	80	95	95	NR	NR	NR	NR	NR	NR

NR - No measurable response.

\* - These data were considered unreliable and were not used in this study.

APPENDIX C

Copy of Currently Used Application for  
Admission to Division for the Deaf at  
Montana State School for the Deaf  
and Blind



MONTANA SCHOOL FOR THE DEAF AND BLIND

Great Falls, Montana

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APPLICATION FOR ADMISSION

This School is open for all children in the State between the ages of six and twenty-one, too deaf or too blind to attend the public schools, and who are of sound mind and free from chronic disease as would prevent study. No charge is made for board, laundry, or medical attention, parents being required only to furnish clothing and pay traveling expenses. Parents deposit ten dollars with the Superintendent each term for incidentals. All pupils must spend the summer vacation at home. Attached to this application must be a medical certificate signed by a doctor indicating that the child is in good mental and physical health and has no contagious disease.

DEPARTMENT FOR DEAF

Please answer the following questions carefully:

1. State full name of child. \_\_\_\_\_
2. Where was child born? \_\_\_\_\_
3. Give year, month and day of birth. \_\_\_\_\_
4. Was child born deaf? \_\_\_\_\_
5. If not born deaf, at what age did deafness occur? \_\_\_\_\_
6. What is the supposed cause of deafness? \_\_\_\_\_

7. Is child totally or partially deaf? \_\_\_\_\_
8. What noises can the child hear? \_\_\_\_\_
9. To what extent can the child hear the sound of the voice? \_\_\_\_\_
10. Can the child understand anything by reading from the lips of the person speaking? \_\_\_\_\_
11. Can the child utter any intelligible words? \_\_\_\_\_
12. Does the child communicate by signs intelligible to those with whom it has constant intercourse? \_\_\_\_\_
13. Is applicant of sound mind? \_\_\_\_\_
14. Does applicant wash and dress, tie shoes, etc., without assistance? \_\_\_\_\_
15. Has child ever been subject to fits? \_\_\_\_\_
16. Does the child have any contagious skin disease? \_\_\_\_\_
17. What is the applicant's general state of health? \_\_\_\_\_
18. Has the child been successfully vaccinated? When? \_\_\_\_\_
19. Has the child been immunized against diphtheria? \_\_\_\_\_
20. Do you consent to have your child vaccinated and immunized against diphtheria? \_\_\_\_\_
21. Has the child ever had spinal meningitis (\_\_\_\_), diphtheria (\_\_\_\_), rheumatism (\_\_\_\_), small pox (\_\_\_\_), scarlet fever (\_\_\_\_), measles (\_\_\_\_), mumps (\_\_\_\_),

chicken pox (\_\_\_\_), whooping cough (\_\_\_\_), or any other contagious disease? \_\_\_\_\_

22. What surgical operations? \_\_\_\_\_

23. Is the applicant a mouth breather? \_\_\_\_\_

24. Is there history of repeated sore throats? \_\_\_\_\_

25. Has there ever been discharge from ears?

State when. \_\_\_\_\_

26. Has applicant ever attended school? If so, where and how long? What grade in school now? \_\_\_\_\_

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27. Give father's full name. \_\_\_\_\_

28. Was there any known peculiarity in the family of the father? That is, were any of the grandparents, parents, uncles, aunts, brothers, sisters, or cousins deaf, blind, or insane, or afflicted with any infirmity of mind or body? (Give names, etc.) \_\_\_\_\_

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29. Were the father's senses all perfect? \_\_\_\_\_

30. What is the father's occupation? \_\_\_\_\_

31. How old was the father when applicant was born? \_\_\_\_\_

32. Give the mother's full name before marriage.

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33. How old was the mother when applicant was born? \_\_\_\_\_

34. Was there any known peculiarity in the family

of the mother? (See question 28.) \_\_\_\_\_

35. Were the parents of the applicant related by blood? If so, in what degree--first, second, or third cousins? \_\_\_\_\_

36. Is parent able to provide clothing, transportation and incidental expense money? \_\_\_\_\_

37. If not, will county or other welfare agency? \_\_\_\_\_  
Specify \_\_\_\_\_

38. Welfare agent in district \_\_\_\_\_  
Address \_\_\_\_\_

39. Give the parents' address in full.  
Street number \_\_\_\_\_  
City or town \_\_\_\_\_  
State \_\_\_\_\_  
Railroad station \_\_\_\_\_

40. State fully how applicant can be reached by telegraph and telephone. \_\_\_\_\_

41. Religious Preference \_\_\_\_\_

\*\*\*

### A G R E E M E N T

The parent or guardian of the child will subscribe the following, viz:

I hereby agree to remove the above named \_\_\_\_\_  
\_\_\_\_\_ from the Montana School for Deaf and Blind when I may be required to do so by the Superintendent, and not to remove \_\_\_\_\_ before the commencement of the

vacation, or to detain \_\_\_\_\_ after the expiration thereof without the permission of the Superintendent.

\_\_\_\_\_  
(Parent's Name)

\*\*\*

For further information address:

SUPERINTENDENT, SCHOOL FOR THE DEAF AND BLIND  
GREAT FALLS, MONTANA

\_\_\_\_\_

DEPARTMENT FOR DEAF

Do not fill in any of the blanks below

No. \_\_\_\_\_ APPLICATION FOR ADMISSION

\_\_\_\_\_  
(Name)

\_\_\_\_\_  
(Post Office Address)

\_\_\_\_\_ County

Filed \_\_\_\_\_

Accepted \_\_\_\_\_ Rejected \_\_\_\_\_

Admitted \_\_\_\_\_

\_\_\_\_\_

MEMORANDA

Final Discharge \_\_\_\_\_

Cause \_\_\_\_\_

\_\_\_\_\_

Montana School for the Deaf and Blind,  
Great Falls