

THE VALUE AND USE OF MUSIC ACTIVITIES IN THE  
TREATMENT OF SPEECH DELAYED CHILDREN

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## ABSTRACT

### THE VALUE AND USE OF MUSIC ACTIVITIES IN THE TREATMENT OF SPEECH DELAYED CHILDREN

By

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The purpose of this study was to assess the value and use of music activities in the treatment of speech delayed children. The question to be answered was: Can a music therapist devise a music activities program for speech delayed children and stimulate these children to use spontaneous speech that is commensurate with their age?

Eight subjects (pre-school children) were randomly drawn from the available population of speech delayed children in therapy at the Speech and Hearing Clinic, Michigan State University. The eight subjects were then randomly assigned to either the control group or the experimental group: four in each group. A regular program of speech therapy was established for the control group and directed by a speech therapist; a program of music activities was devised for the experimental group and directed by a music therapist. Each child received individual therapy of fifty minutes, twice per week, for eight weeks. At the completion of the eight weeks of therapy, each subject



was administered the Houston Test for Language Development.

Results of the study were not statistically significant at acceptable standards. However, statistical analysis showed significance at the .10 level.

Although the results of this study were not statistically significant, it is thought that the study indicates a need for further research in the clinical uses of music activities in a speech therapy program.

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By

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## CHAPTER I

### INTRODUCTION

Through the centuries, people have used music and speech as media of entertainment and communication. Today it is known that both music and speech can be vehicles of much broader educational and emotional experience and are not limited to the stereotyped performances that so often were expected of children for the entertainment of their parents.

Music activities and speech are areas in which children can experience success, belonging, and a sense of satisfaction. It is a societal belief that both have much in common. Both involve imitation, empathy, and sound discrimination. In terms of application to music activities, it has been found that the functional goals for children are fourfold:

1. Physical; better muscular coordination and reaction.
2. Emotional; matching moods and identifying themselves with what they hear through various sound stimuli.
3. Social; active participation, singing and rhythmic activities, developing confidence, and stimulating interest.

4. Intellectual; correlating music with other subjects, places, and things.<sup>1</sup>

These same goals can apply to young children during the development of speech.

1. Physical; neuro-muscular control of the lips, jaw, tongue, and various other important speech producing mechanisms.
2. Emotional; play acting for people through various sound stimuli.
3. Social; interacting with peers, developing confidence, and stimulating interest.
4. Intellectual; relating language and speech with other subjects, places, and things.<sup>2</sup>

These similar goals suggest that it might be advantageous to use music activities and speech techniques in combination to stimulate the young child to use intelligible speech. The question can be raised as to whether or not such a combination could result in better treatment of speech delayed children.

In working with children who show inadequate language development, one often finds (as stated above) that music therapy and speech therapy are working toward the same general goals; yet each discipline is, for the most part, unaware of what the other is doing. It would seem, therefore, that coordination of these therapies would result in

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<sup>1</sup>Louise Kifer Myers, Teaching Children Music in the Elementary School (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1952), p. 9.

<sup>2</sup>Beatrice B. Groginski, "The Use of Music in a Speech Improvement Program in the Kindergarten Class" (unpublished Master's thesis, Texas Women's University, 1960), p. 17.

more efficient total programming for the client. For this program to be effective, the two programs should be designed to allow each to serve and enhance the other. For example, a child is usually pleased with his ability to identify objects or actions by name. When the music therapist can teach the child to identify these objects or actions, the child should be able to experience greater success with the music therapist in therapy. Conversely, if music therapy can create a situation which requires the child to use the words learned in speech therapy, the words may attain greater meaning and significance for the child. In essence, the problem is documenting more and better ways of helping the speech handicapped through the use of music activities.

Vocal music and speech seem to be so closely related that not only are there common perceptual factors operating in both, such as auditory discrimination, aural perception, and muscular coordination, but also there seems to be many possibilities of using music activities in speech therapy. Before more practical work is done in the field of music and speech, it is essential to know more about the relationships between speech therapy and the use of music activities in treating the speech handicapped.

The present study is directed to the greater understanding of this relationship.

The idea of using music in a speech therapy setting is neither new nor original. Such use has been reported by Van Riper and Butler,<sup>3</sup> Anderson,<sup>4</sup> Bryngelson and Mikalson,<sup>5</sup> and Hawk.<sup>6</sup> It is with the belief that music activities can be integrated with and directly supportive to the speech therapy program that this study was undertaken.

In this study music activities were used in an attempt to stimulate speech delayed children to use spontaneous speech.

#### Purpose of the Study

The purpose of this study is twofold. First, an attempt was made to develop and present techniques for speech improvement with speech delayed children, which represented a synthesis of selected procedures of music therapy as well as some conventional methods found in a speech therapy program for speech delayed children. Second, the synthesized

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<sup>3</sup>Charles Van Riper and Katherine G. Butler, Speech in the Elementary Classroom (New York: Harper & Bros., 1955), p. 21.

<sup>4</sup>Virgil A. Anderson, Improving the Child's Speech (New York: Oxford Press, 1953), p. 300.

<sup>5</sup>Bryng Bryngelson and Elaine Mikalson, Speech Correction Through Listening (Chicago: Scott Foresman & Co., 1959), p. 24.

<sup>6</sup>Sara Stinchfield Hawk, Speech Therapy for the Physically Handicapped (Stanford, California: Stanford University Press, 1950), p. 86.

techniques were evaluated and contrasted to conventional methods of speech therapy.

This study seeks to answer the following questions:

1. Will the use of music activities stimulate spontaneous speech?
2. Can a music therapist devise a music activities program for delayed speech children and stimulate these children to use spontaneous speech?
3. Will the use of music aid in the teaching of basic language concepts?

### Definition of Terms

The following definitions are used in the discussions presented in the study:

Therapy is the science which deals with the treatment or application of remedies for the cure, alleviation, or prevention of disorders.<sup>7</sup>

Speech development is best described as a dynamic, continuing learning process.<sup>8</sup>

Auditory discrimination is the ability to distinguish sounds correctly.<sup>9</sup>

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<sup>7</sup>Lee Edward Travis, Handbook of Speech Pathology (New York: D. Appleton-Century Co., 1957), p. 66.

<sup>8</sup>Mildred F. Berry and Jon Eisenson, Speech Disorders (New York: Appleton-Century-Crofts, Inc., 1956), p. 128.

<sup>9</sup>Hallowell Davis, Hearing and Deafness (New York: Rinehart Books, Inc., 1955), p. 153.



Auditory training is the process of teaching the child to take full advantage of sound clues.<sup>10</sup>

"Delayed speech is when a child appears to have an adequate receptive symbol system but the amount of verbal output is not commensurate with his age. When stimulated, the child may speak; and when he speaks, he may show typical vocabulary, morphology, and syntax for his age. The problem seems to be that he is not often motivated to speak. He seems to be inhibited in his desire to communicate orally."<sup>11</sup>

Spontaneous speech is defined as any speech initiated by the child, as opposed to imitative speech.

Music activities can best be described as various musical activities adapted or composed to reinforce and enhance the teaching of specific concepts, language patterns, and for stimulating the child to use spontaneous speech.

Music therapy is defined, for the purposes of this study, as those techniques used in therapy to achieve the established goals. These techniques involve the use of music to stimulate the speech response by always initiating this response by the use of various musical stimuli which follow a specified sequence of events.

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<sup>10</sup>Charles Van Riper and John Irwin, Voice and Articulation (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1958), p. 153.

<sup>11</sup>Leo Deal, Ph.D., Personal Communication, Professor of Speech Pathology, Department of Audiology and Speech Science, Michigan State University, June, 1970.

Speech therapy with speech delayed children is described in the following quotation:

. . . create the necessary motivation, convince the child that it is possible and rewarding to use intelligible speech. The child must come to know the characteristics of the individual speech sounds and the ways in which they occur in words. One must provide simple speech models within the child's ability to duplicate. Through self-talk and parallel talk, one must provide the language symbols needed for thinking, communication, social control, emotional expression, and the development of a self concept.<sup>12</sup>

### Overview

Delayed speech and language development occurs with greater frequency and, at times, with greater complexity than any other known communication disorder.<sup>13</sup> To some degree, both the frequency and the complexity of delayed speech seem to have increased during the last decade.<sup>14</sup> This apparent increase is due, at least partially, to several factors.

First, in this supersonic age in which we live, with its television, telephone, and telespatial communications, there is a tendency for adults to impose stricter demands on young children for earlier and more accurate speech

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<sup>12</sup>Charles Van Riper, Speech Correction (4th ed.; Englewood Cliffs, New Jersey: Prentice Hall, Inc., 1963), p. 151.

<sup>13</sup>Nancy E. Wood, Delayed Speech and Language Development (Englewood Cliffs, New Jersey: Prentice-Hall Foundations of Speech Pathology Series, 1964), p. 1.

<sup>14</sup>Ibid.

development than ever before.<sup>15</sup> Parents, siblings, teachers, relatives, and even neighbors seemingly join in a concerted effort to remind children of the need to speak effectively and clearly.<sup>16</sup> During the last twenty or thirty years, our levels of aspiration for speech development have risen. Therefore, when contrasted with children of the 1940's and the 1950's, children today must learn to communicate very early and on a much more complex level--often because of an emphasis placed upon the need for effective speech as a social tool.<sup>17</sup>

Secondly, according to Wood, more parents have become aware of developmental schedules and the many factors that may interrupt normal development. Through such popular writings as those of Spock, Gesell, Ilg, and Ames, parents are more aware of what a child should be doing at various stages of normal development. With this more critical awareness, parents are seeking professional help earlier than they have in the past. They want to know whether their child is significantly delayed in speech development; and, if so, what can be done to alleviate or to solve the problem.<sup>18</sup>

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<sup>15</sup>Ibid.

<sup>16</sup>Ibid.

<sup>17</sup>Ibid.

<sup>18</sup>Ibid., p. 2.

Another factor, according to Wood, is that medical science has made significant advances in reducing the mortality rate at birth. Today, more children are living who previously would have expired at birth. At the same time, many of the children who have survived traumatic deliveries are found later in life to have subtle and sometimes confusing disorders. Frequently, one of these disorders is a reduced capacity to communicate verbally, for many of these children do not learn to talk at the expected time or with the expected accuracy and frequency.<sup>19</sup>

Finally, Wood stated, the development of new tests, the availability of new clinical services, the wealth of new information from research and the promise of more to come have all sharpened the abilities of specialists to detect the presence of speech and language problems at an earlier age.<sup>20</sup>

For these and other reasons, more and more children are being referred to clinics, diagnostic centers, or specialists in private practice because they do not communicate adequately.

Speech is the primary medium through which we make ourselves understood in everyday life; the vehicle by which we orally express our needs and desires, our hopes and

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<sup>19</sup>Ibid.

<sup>20</sup>Ibid.

fears, our every thought. But speech means more than simply talking to make ourselves understood. Everyday speech is so badly cluttered with incorrect and indistinct diction, poor tone quality, slang phrases, and colloquialisms, it often ceases to be the fine attribute of personality and character that it should be.<sup>21</sup>

### Speech Development

To understand the child's normal speech pattern and to teach the child, it is important also to understand the child's speech development, as presented here.

Speech development is best described as a dynamic learning process, not as a still-life picture.<sup>22</sup> We are not born with either the desire or the need to speak.<sup>23</sup> We learn to speak only because those around us use this method of communication.

Like all types of learned behavior, speech development depends upon the maturation of the individual. Maturation determines when behavior can be learned, for maturation establishes certain periods of life when the organism has established a "readiness."<sup>24</sup>

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<sup>21</sup>George O. Bowen and Kenneth C. Meek, Song and Speech (Boston: Ginn and Company, 1952), p. vi.

<sup>22</sup>Berry and Eisenson, op. cit., p. 128.

<sup>23</sup>Wood, op. cit., p. 1.

<sup>24</sup>Ibid., p. 9.





Wood has adequately abridged the speech development sequence into a short and most understandable form:<sup>25</sup>

Speech sounds develop in a series of stages that proceed from the prelinguistic utterances through the linguistic use of symbols. The prelinguistic stage of development begins with non-meaningful reflexive sounds which are related to the physiological changes in the infant during the first three months of life. From the third to the sixth month, the child gives evidence of responding to his own verbal play. It has been rather clearly proved that babies do not develop speech sounds during this period of non-purposeful vocalization by imitating adults, but rather by imitating their own babblings. Hence, babbling is not true speech; it has no symbolic value. Rather, it is an autostimulation process whereby the child produces sounds randomly and then responds to his own vocalizations.

Developmentally, between the sixth and ninth months, a refinement period occurs; and toward the end of this stage, the child begins to produce paired syllables (for example: bye-bye; mama; dada; bebe). These repetitive sounds are classified too often by anxious parents as speech. Actually, these repetitive sounds are not true speech, for they have no symbolic value. However, repetitions such as these form the basic groundwork for the development of speech.

Up to this point, the average child's speech development can be predicted with a fair degree of accuracy, without too much concern for differences in environment. It is at this stage (6 to 9 months), however, and in the months that follow, that some children are found to proceed more rapidly in speech development than do others. There are many influences which seemingly play a part in this development; environmental differences are of major importance, and it has been demonstrated that a verbally rich environment can accelerate the child's rate of speech development.

From 18 months to two years, a child usually acquires between 10 and 20 words which he can

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<sup>25</sup>Ibid., pp. 10-13.

use meaningfully. Most of these words are nouns, usually the names of people or things. This is the period of echoic speech. During this time, children may imitate words used by adults perfectly, even to intonation and inflection, without knowledge of what the words mean. This is also the period when a child may string various sounds together or develop words that may have meaning for him but for no one else. This type of controlled vocalization is commonly referred to as jargon.

Between the second and third years, a greater growth in vocabulary occurs, within a shorter period of time, than in any other period of life. Part of this growth in vocabulary is due to the fact that sometime during this period, children discover the use of "the question". As any adult who has spent time in the company of a three-year-old can testify, questioning becomes a major communication tool for youngsters of this age. From this point on, the child's speech and language development becomes a process of refinement and growth. Vocabulary increases, and sentence structure becomes more complex. As a social being, the child depends more and more upon words to express his thoughts, ideas, opinions, and wishes.

This study is concerned with those children who do not discover "the question." Many children are slow to say their first words, and some are still unable to speak in simple sentences. Some speech delayed children use only gestures or grunts; others speak copiously, but in a jargon even their parents cannot understand.<sup>26</sup> Some have difficulty in receiving messages; they do not hear or comprehend the spoken word. For a few, the problem seems to be emotional, they do not want or dare to talk. Speech therapists have come to diagnose these children as having

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<sup>26</sup>Van Riper, op. cit., p. 102.

delayed speech problems. These children have failed to acquire normal speech as a usable tool. They have been slow in speech mastery. They cannot use speech as other children do to serve the various needs which speech can serve.<sup>27</sup>

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<sup>27</sup>Ibid., p. 103.

## CHAPTER II

### REVIEW OF RELATED LITERATURE

There is a dearth of controlled reports in which music therapy and speech therapy techniques have been related. However, considerable interest has been shown in such a combination; many articles and reports of techniques have included the combination in a loosely related manner. Today the use of music in speech instruction has led to increasing emphasis for practical research in this area.

Hawk, in her speech work with physically handicapped children, has said, "Chant on four different notes, going up the scale, starting on middle C," and later in the same article, "Imagine yourself climbing a vocal ladder, going up one round at a time until you have reached at least one octave in range."<sup>1</sup> In her work in speech therapy, she found many uses of music to reinforce her approach.

Kuper used musical ear-training in speech therapy. As part of her speech therapy techniques in auditory discrimination, she used musical ear-training in pitch

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<sup>1</sup>Hawk, op. cit., p. 86.

and rhythm perception to help pitch deficient children overcome articulation defects.<sup>2</sup>

McIntyre designed a study to evaluate the effects of a program of creative activities (music activities included) upon the consonant articulation skills of adolescents and pre-adolescent children with consonant articulation disorders.<sup>3</sup> The analysis of the data demonstrated the following:

1. The experimental group (creative arts program) made a significant reduction in the number of consonant articulation errors from pre-to-post test scores. The control group (no creative arts program) exhibited no such change.
2. Greater percentages of children in the experimental group showed improvement in their articulation skills from pre-to-post test than did the control group.
3. The experimental group evidenced significantly greater progress along the error continuum from omission through substitution and distortion and finally to correctly articulated sounds than did the control group.
4. The girls in the experimental group made a significantly greater contribution to the total reduction of consonant articulation errors than did the boys in the same group.

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<sup>2</sup>Eolin Kuper, "Speech Training for Pitch Deficient Children Having Articulatory Defects, by Instruction in Musical Ear-Training in Pitch and Rhythm Perception" (unpublished Master's thesis, John Hopkins University, 1951).

<sup>3</sup>Barbara McIntyre, "The Effect of a Program of Creative Activities Upon the Consonant Articulation Skills of Adolescent and Pre-Adolescent Children with Speech Disorders" (unpublished Ph.D. dissertation, University of Pittsburgh, 1957).

5. A reduction in the number of distortions contributed most to the significant change exhibited by the experimental group from pre-to-post test.

Murphy and Fitzsimmons, in a pilot study, concluded that music therapy had helped improve the subjects' speech.<sup>4</sup> In this study, music was the tool used in treatment for speech problems. The authors concluded that all the subjects were talking more, and all showed considerable improvement in the intelligibility, the inflection, and the spontaneity of their speech. The evaluation was subjective.

Kaplan summarized that a music program had contributed to the established objectives and successes of a speech program for exceptional children.<sup>5</sup> The author did not intend this to be a controlled study but a summary of a music program in operation for children with speech and hearing problems stemming from organic impairments.

Stonely told of the accidental discovery of applying singing techniques in aiding stutterers to overcome their handicaps.<sup>6</sup> It was discovered that stutterers could sing words without the usual hesitation and repetition common to them.

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<sup>4</sup>Albert T. Murphy and Ruth Fitzsimmons, "Music Therapy for the Speech-Handicapped," The Elementary School Journal, Vol. 59 (May, 1959), 111.

<sup>5</sup>Max Kaplan, "Music Therapy in the Speech Program," Exceptional Children, Vol. 22 (December, 1955), 113.

<sup>6</sup>Herbert Stonely, "Music as a Speech Corrective," Music and Letters, Vol. 36 (January, 1955), 40.

Nemoy and Davis used humming up and down the scale for voice building exercises and breathing in and out to music to assist in securing rhythmic breathing.<sup>7</sup>

Scheihing used music in a speech therapy clinic to (1) supplement speech activities with songs that stressed vowel and specific consonant sounds; (2) provide singing activities as a method of communication; (3) provide a socializing activity; (4) provide techniques for gross pitch discrimination; (5) provide opportunity for rhythmic development, muscle coordination, and gross movement to musical rhythms; and (6) provide a media for emotional expression.<sup>8</sup>

Michel described a music therapy program for the speech habilitation of cleft-palate children and related that

not only were the children able to reap the benefits of musical participation in terms of expanded perception of sounds in general--pitch, range, vocal quality, etc.--through singing and other forms of music, but also, many of them were enabled to learn concepts of correct speech articulation through . . . music.<sup>9</sup>

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<sup>7</sup>Elizabeth McGinley Nemoy and Serena Foley Davis, The Correction of Defective Consonant Sounds (Magnolia, Mass.: Expression Co., 1954).

<sup>8</sup>Geneva Scheihing, a personal communication to Dorothy Brin Crocker, "Using Music in a Speech Therapy Program," Music Therapy, 1958, ed. by the National Association for Music Therapy (Lawrence, Kansas: The Allen Press, 1959), 105.

<sup>9</sup>Donald E. Michel, "Music Therapy in Cleft Palate Disorders," Music Therapy, 1961, ed. by the National Association for Music Therapy (Lawrence, Kansas: The Allen Press, 1963), 115.



"Using Music in a Speech Therapy Program," by Crocker, acquainted music therapists with some of the current uses of music by speech therapists and mentioned some techniques used by several music therapists in working with children having speech problems.<sup>10</sup>

Gilliland reported that the music therapist can be useful in speech therapy as follows:

1. Providing music for the vocalization of vowel sounds.
2. Providing rhythmic activities for the identification of speech rhythms.
3. Providing a musical experience for aphasics who can often sing when they cannot speak.
4. Providing a music experience, such as humming, which can help alleviate emotional release when speech is impossible.<sup>11</sup>

These conclusions reached by the author are based on the author's personal experience and beliefs and were not objectively measured.

Although empirical data were not collected, a precedent was set by Arthur and Elaine in the composition of special music for use in speech training.<sup>12</sup> Their songs,

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<sup>10</sup>Dorothy Brin Crocker, "Using Music in a Speech Therapy Program," Music Therapy, 1958, ed. by the National Association for Music Therapy (Lawrence, Kansas: The Allen Press, 1962), 115.

<sup>11</sup>Esther Goetz Gilliland, "Coordination of Music Therapy with Other Adjunctive Therapies," American Archives of Rehabilitation Therapy, 2 (March, 1954), 7-12.

<sup>12</sup>Sister Mary Arthur and Sister Mary Elaine, We Speak Through Music (Valhalla, N.Y.: Stanbow Productions, Inc., 1959), 26.

composed to emphasize particular consonant sounds, were designed for use by the speech correctionist with the child who has an articulation disorder.

A study concerning the effect of music on the articulation patterns of southern Negro children was conducted by Marsh. Results indicated that singing experiences could increase the duration of certain ending consonant sounds when articulated in continuous speech.<sup>13</sup> The author composed special music for the words of the "Pledge of Allegiance to the Flag" with rhythmic and melodic emphasis on the ending consonants of the words: allegiance, stands, and justice. The subjects were divided into three groups: (1) no-contact control; (2) singing; and (3) chanting; and they were exposed to treatment for five minutes on five consecutive days. Speech patterns were analyzed: (a) on the voice spectograph and (b) in terms of articulated syllabic frequency. Results of the study were not statistically significant; however, trends did indicate that music could be effective in teaching certain types of articulation.

Preus concluded from his study that musical memory was not affected by children with articulation disorders. When comparing normal speaking children and children with

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<sup>13</sup>P. Jane Marsh, "The Effect of Music Singing on the Speech Articulation of Negro Disadvantaged Children," (unpublished research paper, Florida State University, 1969), pp. 15-18.

articulation disorders, Preus found no significant difference in musical memory of the two groups.<sup>14</sup>

A series of research studies has been made to determine the relationship between lack of musical talent and speech deficiency. Travis and Davis concluded from their study that the sense of pitch, intensity, and tonal memory enter into the function of speech.<sup>15</sup>

Eisenson, Kastein, and Schneiderman found a statistically significant difference in pitch discrimination between a group of voice defectives and a normal speaking group.<sup>16</sup> Mange, in his study, found that pitch discrimination appears to be related to normalcy of articulation.<sup>17</sup>

Clark, testing the ability of discrimination of simple tunes (as one of 15 tests) in children between the ages

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<sup>14</sup>Alf Edward Preus, "A Comparative Study of Musical Memory in Children with Articulation Disorders and Normal Speaking Children," (unpublished Master's thesis, Dept. of Music, Western Michigan University, 1962), pp. 44-49.

<sup>15</sup>Lee Edward Travis and Mildred C. David, "The Relation Between Faulty Speech and Lack of Certain Musical Talents," Psychological Monographs, XXXVI (1927), 71-81.

<sup>16</sup>Jon Eisenson, Shulemith Kastein, and Norma Schneiderman, "An Investigation into the Ability of Voice Defectives to Discriminate Among Differences in Pitch and Loudness," Journal of Speech and Hearing Disorders, XXIII (1958), 577-582.

<sup>17</sup>Charles V. Mange, "Relationships Between Selected Auditory Perceptual Factors and Articulation Ability," Journal of Speech and Hearing Research, III (1960), 67-74.

of four and six, found a significant difference between her experimental and control groups.<sup>18</sup> In this study, fifteen tests of sensory and motor ability and kinesthetic sensibility were administered to a group of children with functional articulatory defects and a group of normal-speaking children, matched on the basis of age, sex, intelligence quotients and socio-economic status. The results of the study indicated that the experimental group (articulatory defect group) showed a performance that was consistently and significantly inferior to that of the control group (normal speaking children).

Gilkinson found a low order of relationship between musical talent and speech skill in students enrolled in college speech courses.<sup>19</sup> Mase found that there was no reliable difference in the tonal memory and rhythm of children with functional articulation speech defects and comparable children without any speech defects.<sup>20</sup>

In the thesis, "The Use of Music in a Speech Improvement Program in the Kindergarten Class" by B. B. Groginski,

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<sup>18</sup>Ruth M. Clark, "Maturation and Speech Development," in Psychological and Psychiatric Aspects of Speech and Hearing, ed. by Dominick A. Barbara (Springfield, Ill.: Charles C. Thomas, 1960), p. 238.

<sup>19</sup>Howard Gilkinson, "The Seashore Measures of Musical Talents and Speech Skills," Journal of Applied Psychology, XXVII (1943), 444.

<sup>20</sup>Darrel E. Mase, "Etiology of Articulatory Speech Defects," in Columbia University Contributions to Education No. 921 (New York: Columbia University Teacher's College, 1946).

the results indicated by the Wisconsin Phonetic Inventory and the Original Discrimination Test seemed to show little difference in improvement between the group receiving music and speech training as compared with the group receiving speech training alone.<sup>21</sup> However, it was indicated by the author that because of the nature of her study, the data were inadequate to document the results of her study. This study was not specifically geared to any one speech handicap but of the nature of a general speech improvement program.

Varied literature is presented here to point out the widely divergent findings and combination of uses of music with various aspects of speech and speech therapy.

McIntyre, Murphy and Fitzsimmons, Michel, and Arthur and Elaine objectively reported various positive aspects of using music in connection with treating the speech handicapped. Hawk, Kuper, Kaplan, Nemoy and Davis, and Scheihing indicated from personal experiences that music was an effective tool for treating the speech handicapped in combination with speech therapy techniques. However, Clark, Gilkinson, and Groginski found that music used in speech therapy was statistically not an effective tool in treating the speech handicapped.

With the exception of the Marsh study, the review of the literature failed to reveal specific studies in which

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<sup>21</sup>Groginski, op. cit., p. 52.

music therapy and speech therapy techniques have been combined to help solve speech problems identified in any particular diagnostic category. Many authors report the use of music to reinforce a speech program.

The literature does seem to indicate a need for more effective research, particularly focused on specific diagnostic categories of the speech handicapped.

## CHAPTER III

### DESIGN OF THE STUDY

#### Problem

The problem of this study was to assess the effect and use of music activities in a speech therapy program for speech delayed, pre-school children. The question to be answered was this: Could a music therapist devise a music activity program for delayed speech children and stimulate these children to use spontaneous speech?

The primary objective of the experiment can be stated in the form of the following testable hypothesis:

There will be a significant difference in the amount of spontaneous speech exhibited by the experimental subjects (music activities group) as compared to the control subjects (speech therapy group) after eight weeks of therapy.

#### Sample

The sample consisted of eight pre-school children from the Lansing, Michigan, area. These eight children were randomly drawn from the available population of speech delayed children in therapy at the Speech and Hearing Clinic, Michigan State University. All the children were diagnosed "speech delayed" by differential diagnosis, and all had received previous group therapy. These eight

children were then randomly assigned to either the experimental treatment group or the control group, four in each group. All the subjects drawn were males, and all had functional impairments with no known organic problems. The mean age for the experimental group was five years, two months, whereas the mean age for the control group was five years, one month.

The control group received a regular program of speech therapy for speech delayed children, conducted by a graduate student in speech pathology, completing her last term of study for a master's degree.

The experimental group received a program of therapy centered around music activities, geared to speech delayed children, conducted by a graduate student in music therapy, completing his last term of study at the master's degree level.

Both the control and experimental groups were to follow the general treatment goals established by Van Riper for speech delayed children:

In treating the child with delayed speech, . . . the child must come to know the characteristics of the individual speech sounds and the ways in which they occur in words. We must provide simple speech models within his ability to duplicate. Through self-talk and paralleled talk, we must provide the language symbols needed for thinking, communication, social control, emotional expression, and the development of a self-concept . . . <sup>1</sup>

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<sup>1</sup>Van Riper, op. cit., p. 151.





Each subject was scheduled for individual therapy, fifty minutes per session, twice per week for eight weeks. Each subject was administered a pre-test (the Houston Test for Language Development\*). Specific comments regarding the Houston Test are included in the appendix.

After eight weeks of therapy, each subject was again administered the Houston Test for expressive language, and the raw scores from this test were used to assess the strength of the null hypothesis by analysis of the Mann-Whitney U Test.

### Procedures and Techniques of Treatment

#### Experimental Group

Although each child was seen individually, the procedures and techniques employed apply to all the children in the experimental group. The following procedures are based on the assumption that best results will be achieved if the child regards speech training as an enjoyable experience that is closely related to everyday living. The drills were presented in the form of motivated games and

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\*This study was originally designed as a pre-test, post-test control group design in which experimental subjects are assigned randomly from a common population to the experimental and the control group. However, due to a theft of the pre-tests, it was impossible to keep the original design. Therefore, since the subjects were randomly drawn from the available population, the design of the study was changed to a single post-test design, using the Mann-Whitney U test for data analysis. This change was approved by the author's graduate committee.

devices. These motivating devices provided assistance in bridging the gap between formal repetition of speech experiences and the transfer to spontaneous speech.<sup>2</sup>

Most of the music activities used were based upon singing for the following reasons: Singing is thought to be a most pleasurable and effective means of teaching young children; spoken word patterns that might be dull and repetitious drill can be enjoyably practiced over and over as rhythmical phrases in a song.<sup>3</sup> Although the language content of each song used in this study has been the primary consideration in selecting songs, the criteria of being fun for children to sing and suitability to children's voices have been adapted or composed to reinforce the teaching of specific concepts and language patterns. The songs are simple, short, and change only a few key words from one verse to another.

The songs in therapy were used as a referent and followed a specific sequence of events. All activities were devised to stimulate the speech response by starting each activity with music. After the musical response was elicited by the child, a related non-musical activity immediately followed. This procedure was based on the idea that music was used to stimulate these children to use spontaneous speech.

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<sup>2</sup>Nemoy and Davis, op. cit., p. xi.

<sup>3</sup>Alfred Ellison, Music with Children (New York: McGraw-Hill Book Co., Inc., 1959), p. vii.

Each therapy session for the experimental group was patterned after the program described below:

1. The session began with the clinician and the client singing "Good Morning" to each other to the tune of "Happy Birthday." This technique was used to "set the stage" for therapy and establish a musical mood for the therapy session.

2. The traditional "Alphabet Song," sung to the tune of "Twinkle, Twinkle Little Star," was sung and accompanied by such various instruments as the piano, autoharp, and xylophone. After the musical response, the procedure was connected to the speech experience by encouraging the child to talk about the alphabet while he played with alphabet blocks or while he copied certain letters of the alphabet on the chalkboard.

3. Sounds of animals to the tune of "Old MacDonald Had a Farm" were used to stimulate expressive speech. To stimulate the speech experience in this activity after singing the song, the client and the clinician played with toy animals or told stories about these animals or looked at pictures of animals or colored animal pictures in a coloring book. The song "The Farmer in the Dell" was also used to get the speech response.

4. The kazoo, an inexpensive toy musical instrument through which one hums or sings, was used in a game called "Bumblebee," which involved the naming of various parts of

the body. The child would be encouraged to buzz on the kazoo like a bee and then land on some part of the clinician's body at which time the child would be asked to name the part of the body on which he had landed. This procedure was reversed so that the clinician could play the part of the bee and land on some part of the child's body and then ask the child to name that particular body part. Also used was the song "If You're Happy and You Know It, Clap Your Hands," whereby various body parts were substituted in the verse, e.g., stomp your feet, blink your eyes, touch your toes, etc.

5. Basic language concept songs were used to teach such concepts as on and off, open and shut, high and low, up and down, round and round, in and out; and the primary colors were used in conjunction with the song, "The Wheels on the Bus Go Round and Round" (in Appendix A). After singing the song, the child would be encouraged to say and demonstrate the action words used in the song.

6. Story-telling time was used to foster spontaneous speech. Each child was taught and encouraged to participate in the story of "Little Rabbit Foo Foo" (in Appendix B) sung to the tune of "Down by the Station." The clinician would improvise sound effects with the piano to support the story and encourage the child to play tone clusters and glissandos. This activity was introduced as a play experience for fun to help ease the trauma usually associated

with speech handicapped children in therapy. Stories such as "Little Rabbit Foo Foo" were also used to encourage the use of the imagination, reinforce the teaching of singular and plural statements, and teach basic language concepts.

7. Number concepts were taught through song and story. "Little Rabbit Foo Foo" and similar type stories that involved counting, along with the song "Ten Little Indians," were used to teach number concepts. After the response was elicited in song, then a related activity was used to encourage the child to use speech, e.g., the game of cowboys and Indians.

8. Approximately five to ten minutes of every session was devoted to each child's individual preference with a musical activity. At this time, the child could choose the type of music activity he liked best, e.g., singing, playing the autoharp, marching and jumping to music, or playing the piano.

9. Each session ended with the clinician and the client singing "good-bye" to each other to the tune of "Frere Jacques" (in Appendix A).

### Control Group

In the control group, as in the experimental group, each child was seen individually. Although each session did not follow a specified sequence of events for every child as in the experimental group, the speech clinician

cited many common procedures and techniques employed in therapy for every case; and these are listed below:

1. To stimulate the child to use longer phrases and sentences, the clinician provided structured responses for each child to imitate. Each structured response was devised on the basis of each child's ability regarding syntactical ability, memory span of responses, vocabulary, and his understanding of grammar. Each child was encouraged to imitate such phrases as "I want the red head," "I want the yellow leg," (referring to the "Cootie"). The clinician would then ask the child what part of the "Cootie" he wanted. In order for the child to get that part of the "Cootie," he would have to ask for it by using the structured response.

2. Each child participated in activities requiring the taking of turns and some form of competition with the clinician, such as who could build a boat the fastest with the "Build-O-Fun" game.

3. Each child was asked to identify colors, articles of clothing, and body parts with activities such as the "Cootie" and "Popeye the Weatherman" game. The "Popeye the Weatherman" game contains color forms and articles of clothing suited for the four different seasons. The purpose of the game is to dress "Popeye" according to a specified season.

4. The "Alphabet of Sound" pictures were used to stimulate the child visually. The "Alphabet of Sounds" consists of pictures illustrating an action relating to a particular phoneme in isolation. When the clinician provided the oral clue, auditory stimulation was achieved, e.g., the client would be shown a picture of a boy blowing bubbles through a straw which illustrates the /B/ (bah) sound in isolation. The clinician would then provide the oral clue (bah), and this isolated sound was then used in conjunction with a word and then the word was placed in a phrase or sentence. This technique might simply be called a form of sound discrimination.

5. To stimulate spontaneous speech, games such as the "Cootie,"<sup>4</sup> "Zoo-It-Yourself,"<sup>5</sup> "Build-O-Fun,"<sup>6</sup> and "Popeye the Weatherman"<sup>7</sup> were used. In general, these games involve the manipulation of objects, using the imagination, identifying colors and body parts, and the teaching of basic language concepts.

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<sup>4</sup>Cootie--Schoper Manufacturing Co., Inc., Minneapolis, Minn., 1949.

<sup>5</sup>Zoo-It-Yourself--Rexall Drug and Chemical Co., Tupperware Division, Orlando, Florida, 1966.

<sup>6</sup>Build-O-Fun--Rexall Drug and Chemical Co., Tupperware Division, Orlando, Florida, 1965.

<sup>7</sup>Popeye the Weatherman--Colorforms, Inc., Norwood, New Jersey, 1959.



## CHAPTER IV

### ANALYSIS OF RESULTS

The purpose of this study has been to determine whether the addition of music activities in speech therapy would provide the necessary stimulation for the speech delayed child to use spontaneous speech. The results of treatment of speech delayed children in a control group were compared with those children in the experimental group. The control group received a regular program of speech therapy, whereas the experimental group received a program of therapy using music activities as a technique to stimulate the children to use spontaneous speech.

The Houston Test, described in Appendix C, was administered to the children at the completion of eight weeks of therapy in an attempt to measure the resultant differences in spontaneous speech, if any. The Mann-Whitney U Test for ordinal measurement (see Appendix D) revealed that the experimental group was not significantly better than the control group at acceptable levels.<sup>1</sup>

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<sup>1</sup>The Mann-Whitney U Test was chosen for use in this study because the sample size was very small, the study employed two independent samples, and only ordinal measurement was achieved.

Siegel suggests that in contemporary statistical decision theory, a common practice is for the researcher simply to report the levels associated with his findings.

Siegel also suggests that

. . . the reader should not infer that the writer believes in a rigid or hard-and-fast approach to the setting of significance levels. Rather, it is for heuristic reasons that significance levels are emphasized; such an exposition seems the best method of clarifying the role which the information contained in the sampling distribution plays in the decision-making procedure.<sup>2</sup>

The value of some research is lost because researchers fail to report their findings when these findings are not at common, acceptable significant levels. In this study the Mann-Whitney U test revealed U levels of four (4) for the experimental group and eight (8) for the control group. The resultant level of  $U = 4$  of the experimental group is significant at the .10 level. Although this level of significance is less than satisfactory to draw specific and concrete conclusions, it does suggest that the experimental group was experiencing more success in the area of spontaneous speech than the control group. This study suggests that the observed differences between the two groups may be due to chance alone one time out of ten when exposed to the treatment procedures employed for this study.

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<sup>2</sup>Sidney Siegel, Non-Parametric Statistics for the Behavioral Sciences (New York: McGraw-Hill Book Co., 1956), p. 8.

### Discussion

The main purpose of this study was to determine whether the use of music activities could stimulate speech delayed children to use spontaneous speech more easily than regular speech therapy techniques, thus providing an effective and more efficient means of speech therapy when music was used in conjunction with and supportive to a program of speech therapy. The results seem to imply that music activities could be an effective tool for use in speech therapy with speech delayed children.

The theft of the pre-tests prevented statistical measurement from a gain scores technique and necessitated the use of the Mann-Whitney U Test. This study was conducted during the Spring term at Michigan State University. It was impossible to begin another study using a pre-test, post-test design because another group of children was not available for therapy until the Fall term. This researcher was permitted by his advisors to continue this study even though the original measuring tools had to be changed.

Several other aspects of the study seem to warrant discussion. All subjects involved in therapy were males. This fact may suggest inadequate randomization or the need to conduct another study involving only female subjects. This suggestion of another study with only female subjects, using the same therapists as the present study, might offer

some clues as to the influence the therapists have upon the subjects. The fact that the therapist for the control group was a female, whereas the therapist for the experimental group was a male, suggests a need to investigate further the possibility of switching these positions or conducting research that would involve both a male and a female therapist in each group.

The influence of the therapists upon the subjects was impossible to determine, isolate, or measure. In the present study, it is speculated that the influence of the therapists was present in both groups and not isolated to one group or the other. In future studies of this nature, it is recommended that some measure be devised to help isolate this variable.

The diagnostic category of delayed speech posed a problem. The differential diagnosis techniques used by speech therapists do not provide a diagnosis that is specific enough. Further investigation might well be extended to experimental work with children with more noticeable and more specific speech deviations.

The three questions posed in Chapter I can now be answered:

1. Will the use of music activities aid in spontaneous speech? Although the statistical analysis (see Appendix D) seems to suggest that the use of music activities will aid spontaneous speech, the level of significance

is not positive enough to answer specifically this question in the affirmative. Based upon the author's observations and personal experiences in the area of using music activities in connection with speech therapy, it is suggested that a most effective program of therapy for speech delayed children would be one in which music activities were used in conjunction with and supportive to a regular speech therapy program.

2. Can a music therapist devise a music activities program for delayed speech children and stimulate these children to use spontaneous speech? Yes, it seemed evident from the results of this study that a music therapist could devise a music activities program and use this program effectively in therapy. Even though statistical analysis did not demonstrate positive differences between the two groups, it is thought that this question can still be answered in the affirmative. In this study, the experimental group did just as well, if not better, than the control group.

3. Will the use of music aid in the teaching of basic language concepts? There is no clear cut answer to this question. If we use the level of significance of .10 as being acceptable, the results would tend to indicate that music activities could be an effective tool for teaching basic language concepts. The Houston Test, used as the measuring device for this study, specifically measures various aspects of language concepts. The better rankings

exhibited by the experimental group tend to support the claim that music would be an effective tool for teaching language concepts to speech delayed children.

In general, this study has not demonstrated that music activity was the reason for the conclusions drawn from the data. However, the results do suggest that the music activities group, conducted by a music therapist following a specified program of events, exhibited a greater amount of spontaneous speech than did the control group, as measured by the Houston Test.

Specific techniques for using music activities to stimulate spontaneous speech have been described and applied in this study. It is speculated that any positive aspects exhibited by the experimental group were due to several reasons: (1) a societal belief that music is pleasurable and experiences associated with music are fun, (2) music provided a more comfortable atmosphere with less pressure placed upon the specific speech experience, and (3) music provided an acceptable outlet for feelings of frustration, hostility, and aggression which are generally associated with the speech handicapped.

The author wishes to acknowledge the limitations of the study presented here and to point out that the inferences made to the population are limited in that they can only apply to pre-school children with delayed speech problems.

### Recommendations

While the results of this single study do not conclusively support the hypothesis, it does point out the need for further research. Further investigation in this area of a combined approach might well be extended to experimental work with children with more noticeable speech deviations such as specific articulation disorders, because of the need for a more specific diagnostic category. In view of the results implied here, as well as the findings of several other investigators, it might be found that the addition of music to a speech program for speech handicapped children would have specific value and far-reaching effects. The possibilities here are vast, not only from the standpoint of speech itself, but also in the areas of relaxation and muscular coordination which are so essential for better speech.

Further research is needed to define limitations, uncover more efficient methods of therapy techniques for the speech handicapped, and explore different designs for better research.

## **APPENDICES**



**APPENDIX A**

**MUSIC AND LYRICS**

## APPENDIX A

The following four pages contain the music and lyrics to songs used with the children in the experimental group.

The language content of each song used in the experimental group has been the primary consideration in selecting these materials.

All songs were adapted from traditional songs.

GOOD MORNING SONG  
(Happy Birthday To You)

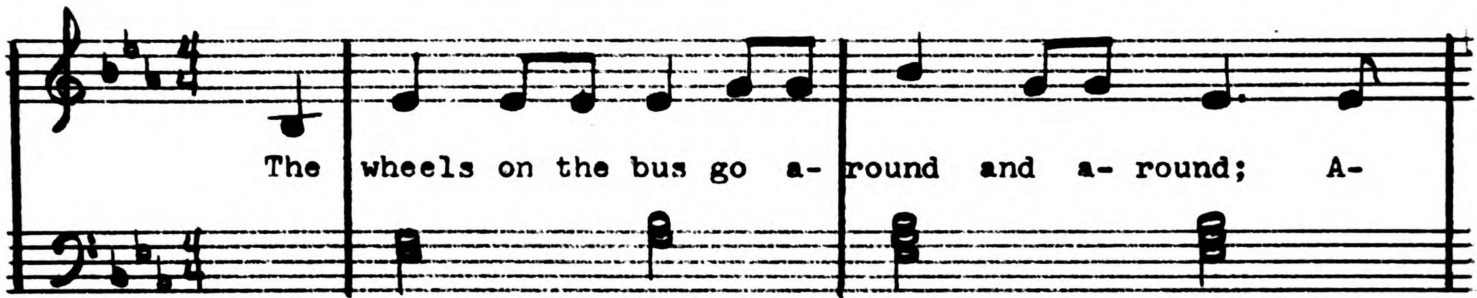
The musical score is written for voice and piano. The key signature has one flat (B-flat) and the time signature is 3/4. The melody is in the voice part, and the piano accompaniment is in the right and left hands. The score is divided into two systems. The first system contains the first two lines of the song, and the second system contains the next two lines. The lyrics are written below the voice staff. The piano part features chords and single notes in both hands. The first system ends with a double bar line. The second system ends with a double bar line.

Good morn-ing to you, Good morn-ing to you, Good

morn-ing, Hi \*, I'm glad to see you.

\*Name of child

## THE WHEELS ON THE BUS GO AROUND AND AROUND



The wheels on the bus go a- round and a- round; A-

This musical system consists of a treble and bass staff in 4/4 time. The treble staff contains a melody of eighth and quarter notes. The bass staff provides a simple accompaniment with chords and single notes.



round and a-round, a- round and a-round: The wheels on the bus go a-

This musical system continues the melody and accompaniment from the first line, maintaining the 4/4 time signature.



round and a- round, All through the town.

This musical system concludes the phrase with a double bar line. The melody and accompaniment continue as in the previous systems.

## Lyrics to

The Wheels on the Bus Go Around and Around

## 1. Sing about the parts of a bus:

The wheels	on the bus	go around and around.
lights		go off and on.
door		goes open and shut.
windows		go up and down.
(windshield) wipers		go back and forth.
horn	on the bus	goes beep, beep, beep.
motor		goes vroom, vroom, vroom.
children		go bounce, bounce, bounce.
driver		says "move on back."

## 2. Sing about the parts of a room:

The window	in the room	goes up and down.
door		goes open and shut.
door on the cabinet		goes open and shut.
hands on the clock		go around and around.

## 3. Sing about other vehicles:

The wheels on the firetruck	go around and around.
siren	goes whooooooooo.
ladder	goes up high.
firemen	hang on tight.

## 4. Sing about colors of objects:

The color of the bus is	red, red, red.
firetruck is	red, red, red.
taxi-cab is	yellow, yellow, yellow.
your bike is	green, green, green.

GOOD-BYE SONG  
(Frere Jacques)

Time to go home, Time to go home, Yes it is, Yes it is,

The first system of the musical score for 'Good-Bye Song'. It consists of a vocal line and a piano accompaniment. The key signature is one sharp (F#) and the time signature is common time (C). The vocal line begins with a treble clef and a sharp sign. The piano accompaniment is written for a grand piano with a treble and bass clef. The lyrics 'Time to go home, Time to go home, Yes it is, Yes it is,' are written below the vocal line.

It is time to go home, It is time to go home, Good-bye \*

The second system of the musical score. It continues the vocal and piano parts. The lyrics 'It is time to go home, It is time to go home, Good-bye \*' are written below the vocal line. The piano accompaniment features a more active bass line in this system.

Good-bye \* \_\_\_\_.

\*Name of child

The third system of the musical score. The vocal line ends with 'Good-bye \* \_\_\_\_.' followed by a double bar line. The piano accompaniment continues for a few measures before also ending with a double bar line. To the right of the piano part, the text '\*Name of child' is printed.

**APPENDIX B**

**STORY OF LITTLE RABBIT FOO FOO**

## APPENDIX B

The following story of "Little Rabbit Foo Foo" is sung to the traditional tune of "Down By the Station."

### Little Rabbit Foo Foo

Little Rabbit Foo Foo  
Hopin' through the forest  
Picking up the field mice  
and foppin' em on the head.

(Spoken in a very scary voice)  
Down came the fairy Godmother and she said

Little Rabbit Foo Foo  
I don't want to see you  
Picking up the field mice  
and foppin' em on the head.

(Spoken)  
"I'll give you three chances, (two, one, verses)  
and then I'll turn you into a goon."  
Little Rabbit Foo Foo was so scared he ran all the  
way home and jumped into bed.  
(Snore)

The next morning he woke up, rubbed his eyes,  
stretched; he went to the window, opened the  
window, took a deep breath and said:  
"Oh what a beautiful morning. . . I think I'll  
go outside."

Repeat above verses and dialogue until down  
to one chance.

(Last chance) (Also spoken)  
I gave you three chances, so now I will have to  
turn you into a goon, and she did.  
THE MORAL OF THE STORY IS:  
"HARE TODAY, GOON TOMORROW!!!"



**APPENDIX C**

**THE HOUSTON TEST FOR  
LANGUAGE DEVELOPMENT**

## APPENDIX C

### The Houston Test for Language Development

Author: Margaret Crabtree, Ed.D.

Year: 1963 - Part II (for children 3 to 6 years)

Publisher: The Houston Test Co.

P.O. Box 35152

Houston, Texas 77035

A search of the literature revealed very few tests that could be used to assess the expressive language of a child. The Houston Test for Language Development was chosen for this purpose.

The Houston Test specifically measures spontaneous speech. It measures and evaluates a child's responses to various stimuli, length of words, syntax, and number of words are the measures recorded for scoring. The results of the test are given in a raw score which can be converted to language ages.

Language development, like all other growth processes in children is irregular. Therefore, it is inappropriate to make too exacting an application of the scale to a specific age. If a child's total score is within a year of the norm set, his performance is considered adequate.

The age levels for this test have been stated in broad rather than in specific terms. Language does not

develop in precise time increments such as a month but develops irregularly like all other areas of growth in children. It does develop, however, in a certain time-order. A child should not be considered speech delayed if he scores within a year of the norms for his age. He does have a problem if he scores two or more years below those set for his chronological age.

The reliability of the Houston Test is certainly questionable. The norms established for Part II of the Houston Test were based on a sample of 215 white children in the greater Houston area. These children were equated as to age and sex. The items were scored on a percentage basis and were arranged according to difficulty. A reliability coefficient was not given.

The materials needed for administering the test are as follows: the manual of instructions, vocabulary cards (20 pictures of common objects, 9 colored pictures for naming action, 3 colored pictures for eliciting a descriptive word, and 6 cards for naming colors), miniature objects, crayons and drawing paper, and a record form.

Each child is administered the test individually. The test is untimed. The items need not be administered in order except those dealing with vocabulary and articulation. The test takes about 30 minutes to administer.

Some examples from the Houston Test are listed below:

- I. Self Identity--the child is asked to tell his name and age.
- II. Body Parts--the child is told to identify the following body parts:
  - chin
  - elbow
  - knee
  - ankle
- III. Body Parts--the child is then asked to answer the following questions:
  1. Point to and tell me what you see with? (answer is eyes)
  2. Point to and tell me what you hear with? (answer is ears)
  3. Point to and tell me what you eat with? (answer is mouth)
  4. Point to and tell me what you smell with? (answer is nose)
  5. etc.
- IV. Auditory Judgement--the child is asked to make the following judgements:
  1. Which is bigger--mommy or baby?
  2. Which is faster--a truck or an airplane?
  3. Which is older--daddy or baby?
  4. etc.
- V. Gestures--the child is asked to demonstrate each of the following:
  1. Clap your hands.
  2. Close your eyes.
  3. Show me your teeth.
  4. Pretend to comb your hair.
  5. Pretend you are eating an ice cream cone.
  6. etc.

Other items on the test include the following:

- Syntactical Complexity
- Sentence Length
- Prepositions
- Serial Counting
- Object Counting
- Repetition of Speech Patterns

**Repetition of Melodic Patterns**

**Geometric Designs**

**Verbalizations while Drawing**

**Verbalizes (tells a story) about Drawings**

**APPENDIX D**

**ANALYSIS OF DATA--**

**MANN-WHITNEY U TEST**

# APPENDIX D

## Mann-Whitney U Test

Experimental Group		Control Group	
Raw Scores	Rank	Raw Scores	Rank
26	6	31	5
35	4	36	2.5
47	1	36	2.5
15	7		
	$R_2 = 18$		$R_1 = 10$

$$U = n_1 n_2 + \frac{n_2 (n_2 + 1)}{2} - R_2$$

$$U = (4)(3) + \frac{4(5)}{2} - 18$$

$$U = (12 + 10) - 18$$

$$U = 4$$

$$U^1 = n_1 n_2 - U$$

$$U^1 = 8$$

This resultant level of  $U=4$  is significant at the .10 level.

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