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AUTHOR DiJohnson, Albert; And Others
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ABSTRACT

The Verbotonal method of teaching the deaf (that is, training the deaf to make maximum use of their limited hearing) is considered in relation to the effect it has on verbal communication. Results from a sample of 50 nursery school students indicate that (1) the speech of the children taught by Verbotonal improved significantly more than did the speech of the children taught by a typical conventional approach; (2) for those children who scored high in social competency and in lipreading, the speech gains of the Verbotonal pupils were approximately twice the speech gains of the control children; (3) four American teachers successfully learned the Verbotonal method of teaching the deaf; and (4) video tapes were produced to document the Verbotonal method and the successful results achieved with this method. See also TM 001 130-133 for the various speech tests and teacher evaluation form used in the study. (AG)

RESEARCH REPORT

Pennsylvania Project to Rehabilitate Deaf and Hard-of-Hearing Children

An interim report

Pennsylvania Department of Education 1971

AN INVESTIGATION OF THE VERBOTONAL METHOD WITH PRESCHOOL DEAF CHILDREN: A PRELIMINARY INTERIM REPORT

Pennsylvania Department of Education 1971

Commonwealth of Pennsylvania
Milton J. Shapp, Governor

Department of Education
David H. Kurtzman, Secretary
Neal V. Musmanno, Deputy Secretary

Office of Educational Research & Statistics
Paul B. Campbell, Director

Bureau of Educational Research
Robert B. Hayes, Director

Division of Applied Research
John G. Cober, Director

AN INVESTIGATION OF THE VERBOTONAL METHOD WITH PRESCHOOL DEAF CHILDREN: A PRELIMINARY INTERIM REPORT

by Albert DiJohnson, Ed.D., Educational Research Associate
Division of Applied Research
Bureau of Educational Research
Pennsylvania Department of Education

and

William N. Craig, Ph.D.
Helen B. Craig, Ph.D.
Western Pennsylvania School for the Deaf

October 1971

STATEMENT OF THE HONORABLE MILTON J. SHAPP,

GOVERNOR OF THE COMMONWEALTH OF PENNSYLVANIA

I am proud that Pennsylvania is assuming the leadership in this effort which is bringing new hope to thousands of deaf and hard-of-hearing children and adults as well--not only in this Commonwealth, but throughout the Nation. Early research reports provided by the Pennsylvania Project in Pittsburgh indicate that the speech skills of many deaf and hard-of-hearing children can be improved by this special method.

Our goal is to help deaf and hard-of-hearing children now in our institutions and in special classes so that they can be returned to regular public school classrooms and to the normal hearing society.

The benefits would be many to both the children and the Commonwealth. I look with great interest upon this project and its promise of a new hope for the deaf.

MILTON J. SHAPP
Governor

FOREWORD

Sharing the expressions of our Governor, Milton J. Shapp, we are indeed proud that the Pennsylvania Department of Education is directing this innovative research project to rehabilitate deaf and hard-of-hearing children in cooperation with the Western Pennsylvania School for the Deaf.

In this preliminary interim report of our research project, we are greatly encouraged by the promising results carefully noted in the progress of the children.

Along with our total support, we express gratitude to members of our Department staff, especially the Project Director, Dr. Albert DiJohnson; to the staff of the Western Pennsylvania School for the Deaf, particularly Dr. William Craig, the superintendent; and to the Yugoslavian teachers and Dr. Petar Guberina, the international scientist from whose original discovery this methodology was developed.

As the research demonstration project continues, we express our confidence in the many participants and reaffirm our hope for success.

David H. Kurtzman

Dr. David H. Kurtzman
Secretary of Education

Neal V. Musmanno

Dr. Neal V. Musmanno
Deputy Secretary of Education

TABLE OF CONTENTS

SUMMARY

The major focus of this study was to determine the effect of the Verbotonal method of teaching the deaf upon the improvement of speech. This method emphasizes training to help the deaf make maximum use of their limited hearing. Sign language is not taught and lipreading is not taught formally since it is believed that such instruction results in the deaf not concentrating to the maximum on the difficult but extremely vital area of vocal communication.

Fifty nursery children (ages three and four) in the Western Pennsylvania School for the Deaf were randomly assigned to experimental and control groups. Three Yugoslavian teachers were personally selected by Dr. Petar Guberina to train and to assist the four American teachers of the children taught by Verbotonal. Each group was taught by the assigned strategy between January 10, 1971 and May 10, 1971. Considerable pre- and posttesting was conducted.

Such results as these occurred: (1) The speech of the children taught by Verbotonal improved significantly more than did the speech of the children taught by a typical conventional approach; (2) for those children who scored high in social competency and in lipreading, the speech gains of the Verbotonal pupils were approximately twice the speech gains of the control children; (3) four American teachers successfully learned the Verbotonal method of teaching the deaf; and (4) video tapes were produced to document the Verbotonal method and the successful results achieved with this method.

Introduction

Despite a recent accelerated interest in the early identification of deafness, the educational programs for the preschool prelingually deaf children so identified, have not resulted in corresponding communication gains. This lack has been noted in schools and programs all over the United States, as reported by Babbidge, 1965; Quigley, 1966; Craig, 1969; and Rosenstein, 1966. In the behavior of the young deaf child, this deficit is especially observable in his speech performance, in his skill in auditory discrimination, in his ability to lip read and in his functioning in social interactions which largely depend on intact communication modalities.

The stated purpose of the Pennsylvania study, sponsored by the Department of Education, was to systematically use the Guberina Verbotonal system with the preschool children at the Western Pennsylvania School for the Deaf in an attempt to improve performance in these deficient communication skills.

The Guberina Verbotonal Methodology and Suvag (Systems Universal Verbotonal Auditory Guberina) equipment offer promise of a major breakthrough in helping the deaf to make maximum use of their residual hearing and thereby to learn to speak effectively. The Verbotonalists contend that most schools for the deaf are incorrectly immersing the hearing-impaired in a multisensory program which permits them to substitute manual, written or other visual communication for the more difficult aural-oral skills. Thus, according to the theory, too few deaf children in conventional schools learn to make maximum use of their residual hearing, and do not master intelligible speech. Verbotonalists also advocate the use of much broader frequency amplification and wider use of special filters than is provided by conventional standard auditory equipment.

The Pennsylvania project permits a different, more rigorous demonstration of the Verbotonal method than provided previously. Earlier projects dealing with the Verbotonal method were the 1966-1970 Columbus, Ohio study, the 1968 project in Toronto and the ongoing Asp study at the University of Tennessee. Observers of the various demonstrations subjectively feel that many children have been helped to effective speech and language skills. Some typical comments are:

> We see language coming in spite of the fact that it is just the beginning of the program. We also see a little bit of reading at this early date, too.... (Elizabeth Titsworth, Volta Review, October 1969, p. 216)
>
> I think that one valid observation would be that the children tend to vocalize more. (Carl Asp, Ibid, p. 222)
>
> As to the Suvag apparatus, which both writers have been demonstrating, there is no doubt that the acoustic response of profoundly deaf children is very impressive.... (Emily Froeschels, and H. Beebe, Ibid, p. 224)

However, earlier demonstrations can be criticized on the following points: (1) too few children have been used, (2) preschool children could not be effectively followed into the primary grades, (3) in many cases, the Verbotonal method was separated from its broad frequency and filtered equipment, (4) the Verbotonal teaching strategy was not sufficiently delineated from ongoing methodologies and (5) there was a lack of adequate and ongoing participation by Dr. Petar Guberina, the founder of the Verbotonal system, in the training of teachers.

This project overcame the preceding criticisms by documenting the Verbotonal method and teacher training procedures through video tapes of classroom activities, production of original curriculular materials and close and continuing contact with the Guberina training team, and by making available contrast groups for comparative purposes.

The results should be applicable to a much larger population of hearing-impaired children than those used in this study, including those children in the public school setting whose auditory loss places them at a disadvantage while they compete, without adequate help, with normal hearing children.

Related Research

An interview by Mr. George W. Fellendorf of the Alexander Graham Bell Association with Dr. Petar Guberina (Volta Review, October 1969) and a number of mimeographed copies of Guberina's speeches relating to the method, together with personal communications and visits with deaf educators who have been involved with the Verbotonal method, have proved stimulating and suggestive. Although there is a dearth of published research specifically related to the Verbotonal method, some related findings lend credibility to various aspects of the Guberina method.

Reddell and Calvert (1966) utilized selective amplification based on individual hearing losses. They reported findings of 24 subjects with high frequency loss with no previous experience with hearing aids in which the subjects' responses with aids adjusted to their particular hearing losses proved to be superior to commercially available hearing aids selected by customary audiological procedures.

Briskey and his associates (1967) found that a favorable change was observed in the speech and voice of many deaf children after six months of using a low frequency hearing aid. The results further indicated that more deaf children responded with observable changes in one of several voice characteristics while wearing a hearing aid that extended down to 100 cycles per second than children wearing an ordinary aid. They concluded that some children with profound hearing impairment do receive amplifications

in the low frequencies which help them to utilize their residual hearing to the maximum.

A preliminary report by Guttman and his co-workers (1969) discusses articulatory training of the deaf using low-frequency surrogate fricatives. Clinical observations indicated superior improvement in speech production by the experimentals who had had low frequency amplification.

The use of body exercises per se as a specific intervention aimed toward enhancing sensory acuity is not a completely novel approach. Beebe and Weiss (1951) have discussed the "chewing method" as a useful tool in teaching the congenitally deaf to speak. It is postulated that there is a functional connection between all the voluntary muscles of the body. Froeschels and Beebe (1969) have used the chewing approach with various hearing disturbances. In short, exercises which generate optimal tension in those specific muscles which are associated with the pronunciation of particular speech sounds appear to enhance the development of speech. Froeschels and Beebe found natural speech melody evident in the voices of the deaf as one of the most impressive proofs of utilizing specific exercises.

It would appear that these two aspects of the Guberina method are corroborated by various studies--the use of low frequency and selected amplification and the use of specific body movements to stimulate voice production and articulation.

Objectives

A major objective of the Verbotonal demonstration project was to determine if the use of the Verbotonal approach would improve the communication performance of preschool deaf children above that attained by the traditional method. The areas of communication performance examined were speech, auditory discrimination, lipreading, recognition of written symbols, communicative interactions and social behaviors.

Another major objective, critical to the implementation of the first, was to determine the efficacy of training the American (traditionally trained) teachers in the Verbotonal method--requiring precise delineation of the approach and involving both the ability of the Yugoslavian team to transfer the experimental techniques to the American teachers and the capability of the American teachers to systematically conduct this program.

Procedures

To implement these objectives, the essential procedures described below were followed, with minor variations accruing from the actual process of program initiation. In particular, the importance of the teacher training aspect for fully carrying out the intent of the project became increasingly apparent and was allotted more time than originally planned.

(1) The 50 children in the Western Pennsylvania School for the Deaf nursery school (ages 3 and 4) were used as subjects, with 25 children randomly assigned to the experimental (Verbotonal) and 25 to the control (traditional) groups. (For pretest comparison of these groups, see Appendix G, Table I.) Four classes were formed in each group. The 25 children in the experimental group were instructed according to the Verbotonal procedures. This instruction was initiated January 4, 1971, with the arrival of the Yugoslavian teachers, and ended June 11, 1971 at the close of the school year.

(2) Four teachers trained in conventional educational approaches and four to be trained in the Verbotonal method were randomly selected from the faculty of the school. Of those selected, two were not interested in being Verbotonally trained at this time, thus altering somewhat the original random selection.

(3) Three Yugoslavian teachers from Zagreb University were assigned to assist and train the experimental group teachers. The four American teachers daily observed the Yugoslavian teachers working both with groups of children and during individual therapy. After school sessions were provided for additional in-service training involving Verbotonal theory, body movements and introduction to the Suvag equipment.

(4) Video taping schedules were established to film activities of both Verbotonal and the traditional methods. These tapes will assist in documenting the Verbotonal method, in providing additional

contrast between treatments, in evaluating training teachers' competency in the Verbotonal approach, and in providing materials for in-service training sessions. Over 20 hours of video tape were accumulated. Both groups were taped in order to help minimize the Hawthorne effect.

(5) The necessary Suvag equipment was procured. A local technician was given specific instruction in the evaluation, service, and maintenance of this equipment.

The two groups of pupils were taught specifically by the two different approaches--the control group by the traditional, the experimental by the Verbotonal. All teachers have been trained in and have had experience using traditional methods. The experimental teachers were American teachers who were trained in the Verbotonal method by the supervising teacher for the Verbotonal program in Yugoslavia. During the first 30 days, one hour after school (three days per week) was used for in-service training. Dr. Guberina's staff directed the training which included group work, individual work and familiarization with Suvag equipment. In addition, the American teachers were assisted by the three experienced Yugoslavian teachers throughout the school day. The Yugoslavian teachers remained at the school for the length of the project. During the program implementation, both the experimental and the control groups were provided with qualified supervisors experienced in the designated methods.

Each group was taught according to the assigned teaching strategy for the remainder of the year--January 10, 1971 to May 10, 1971.

Treatments

In contrast to the conventional multisensory approach to teaching the deaf, Verbotonal has a predominately unisensory emphasis. Professor Guberina wants children to concentrate on using their residual hearing in learning to hear and to speak. Verbotonalists claim that the standard approaches have the effect of encouraging children to communicate manually

and visually, rather than making maximum use of their hearing. As a result, they do not learn to speak effectively via the standard multisensory method.

For both group and individual training, conventional equipment has a frequency range from 300 to 3,500 cycles per second while the Verbotonal equipment (Suvag I) extends from 1 to 20,000 cycles per second. After the child in the Verbotonal approach perceives the middle frequency speech sounds, the Suvag II is used individually to locate and to utilize the child's optimal hearing range. Guberina has also developed his own Verbotonal audiometer in keeping with his broad, extended frequency theory and a Suvag-lingua for diagnostic use with deaf children with multiple handicaps.

Rather than the more conventional lists, the Verbotonal method uses a sequence of individual syllables such as /ba/ and /pa/ and /ma/ in the low frequency range and then gradually progresses to words and combinations of words which use these individual syllables. The first words are in the low frequency range in the Verbotonal approach.

Teachers in the Verbotonal group used the Guberina method and the Suvag equipment. The speech sounds were transmitted in the most appropriate frequency range which can be determined by the band which is best suited for the transmission of a particular sound and that band which the diagnosis of the child's hearing loss suggested as the most productive one. Speech sounds were presented in the order suggested by the proponents of the Verbotonal method. Speech stimulation included: (1) body movement, (2) musical stimulation, (3) implementation and (4) individual work.

For the first part of each session, body movements were utilized to facilitate emission and correct articulation for the desired sound. For example, for the sound of "p" in "pop," the teacher worked with the

children from a relaxed position to a tense position. During the period of maximum tension, as when the teacher and the children are stretching, the children and the teacher spoke the word "pop." Because the sound of "p" is a tense sound, it was always taught when the body assumed the position of maximum tension. However, the teacher taught the voiced consonant "b," which is less tense, by going from a tense position to a relaxed position.

For the second activity, musical stimulation, the children and the teacher simultaneously clapped and spoke phrases in the rhythm which was functionally best for the syllables to be learned.

For the implementation of the language building session, the teacher attempted to relate the therapy words to meaningful language concepts. For example, after a child learned to speak the word "up," he would take a step "up" while he said the word. The Verbotonal approach featured body movements and musical stimulation as an integral part of the presentation of speech sounds and of connected language units.

During the individual session, the teacher stimulated the child by speaking a series of familiar words. After each word, the child responded by attempting to speak (imitate) the word the teacher had spoken. After the stimulation by the auditory training unit, the teacher removed the headset, and the child would receive the same stimulation in a free-field situation (no amplification). These individual sessions were used to improve the auditory perception and the speech production of each child. (See Appendix A for further description of Verbotonal.)

Descriptions of the traditional method are available in teaching manuals at the school. (A brief resume is available in Appendix B.)

Evaluation

A. Communication Performance

Communication performance was evaluated pre- and posttreatment for the variables of speech production (accuracy and quality), lipreading and social competence. Intelligence quotient was also measured pre- and posttreatment, and the hearing loss of all subjects was measured prior to initiation of the project.

1. Speech production was measured, using a 44-item Preschool Speech Production Test developed specifically for this study. This test is a combination of a Verbotonal Vocalization List (a list of 19 phonemes and syllable combinations--vocalization and babbling units--suggested by the Yugoslavian teachers) and a Craig Word List (a list of 25 words selected from the Craig Lipreading Inventory and representative of the most commonly produced Standard American English phonemes). A copy of this test is included in Appendix C. The test was administered individually by a teacher-examiner who presented the spoken stimulus to the child, with amplification but without lipreading cues. For the 19 vocalization items, only the auditory stimulus was presented to the child; for the 25-item word list, the child was also shown a picture of the word being spoken. In each case, the child was required to repeat the spoken stimulus.

The test was evaluated on: (1) the intelligibility of the child's spoken response--the accuracy with which he reproduced the spoken stimulus and (2) the quality of his spoken response--specifically in terms of strength and pitch. The sounds and words chosen proved suitable for the subjects used in this study, and a sufficiently extended range of scores was possible.

In addition, a Preschool Connected Speech Inventory (a list of phrases and simple sentences, accompanied by pictorial clues) was developed to provide more information on intonation patterns in connected speech, while remaining commensurate with the limited language abilities of the children involved. A copy of this test is included in the Appendix D. Again, the spoken stimulus, along with appropriate pictorial cue, was presented individually, with amplification and without lipreading cues, to the child who was requested to repeat what he heard.

The children's performance on the speech production tests was recorded on audio tapes and later judged by three independent evaluators, all currently employed by the Bureau of Educational Research and having extensive backgrounds in the area of language arts. The tapes were presented to the judges in random order so that no judge was aware either of the group (Verbotonal or conventional) or the time (pre- or posttreatment) represented by the child being judged.

Intelligibility or accuracy of speech production was determined by evaluating the similarity of each response by the child to the stimulus presented by the teacher. A six-point scale was used with which the judges rated the similarity of the child's response to the stimulus: 0--represented no response; 1--no (not similar); 2--I'm not certain, but I think not; 3--I'm not certain, but I think so; 4--yes (similar) and 5--very good (very similar).

Quality of speech production was determined along two dimensions--strength and pitch. For each dimension, a six-point scale was used, with the judges' six possible responses paralleling the semantic descriptions used for determination of intelligibility. For strength, the scale was: 0--very poor (weak); 1--poor; 2--I think poor; 3--I think good: 4--good and 5--very good (strong).

For pitch, it was: 0--very poor (too high or too low); 1--poor; 2--I think poor; 3--I think good; 4--good and 5--very good.

Agreement among judges was high, as can be seen by the following results: (1) Seventy-five responses and evaluations were randomly selected and the average discrepancy among the judges was 1.14. An average discrepancy of 8.00 was possible. (2) Eight tapes were randomly selected for determining a Kendall Coefficient of Concordance (w) among the judges. The resultant coefficient--.94--reflects an exceptionally high degree of agreement. (3) The same tapes were used to replicate the judges responses. Without their knowledge, eight tapes were evaluated twice. The percentage of agreement for each of the evaluators between similar tapes ranged from .92 to .97, with the average for the entire group for all the tapes being .95. It also appeared that the judges were able to function well within the framework outlined after careful study of six tapes (each tape representing one child's response to all the stimuli presented to him at pre- and posttests).

A Likert-type item analysis of the 44 individual items on the Preschool Speech Production Test produced a high Alpha Coefficient of Reliability (greater than .95) and a comparatively high inter-item average correlation (greater than .30). As the latter indicates that the test is composed of relatively homogeneous items, and as a shorter test would be desirable to combat fatigue and lack of attention, this analysis suggests that a number of items might profitably be eliminated, retaining those items whose discrimination ability is the greatest (i.e., those for which the difference between means of high and low scoring groups results in a "t" of greater that 4.00).

2. Lipreading ability was evaluated via the Craig Lipreading Inventory. This measure, developed originally for deaf children in the primary grades and older and presented either live or by 16mm film, proved also to be effective

with the younger children when presented live and with the individual pictorial test sheets (as included in Appendix E). A Likert-type item analysis done on this test showed an Alpha Coefficient of Reliability greater than .80, which is considered sufficiently high for tests of this type where skills necessary to perform well on one item may be somewhat independent of the skills required to perform well on another. As this independence is also indicated by the relatively low inter-item average correlation (.10), it would be inappropriate to reduce the number of test items. Because the present inventory, by design, represents a meaningful sample of the phonemes in Standard American English, because it allows measurement of growth in lipreading skill relative to ability to discriminate greater numbers of phonemes and because of the item independence indicated above, the Craig Lipreading Inventory is considered appropriate for future use with this age group without requiring change.

3. Social competence was measured with the California Social Competency Scale, a test which proved relatively effective in terms of the items used, the range of scores and its ability to discriminate between high and low scorers. Initial analysis of this test shows that it is composed of relatively homogeneous items, indicating that a number of items may be dropped without restricting the information gained on social competence.

4. Intelligence was measured with the Leiter International Performance Scale, a nonverbal, individually administered test standardized for ages 2 through 12. Birch and Birch (1956) have found the Leiter scale a valid and reliable predictor of school performance of young deaf children.

5. Hearing loss was evaluated using standard audiometric procedures.

6. Additional variables for evaluation, as proposed originally, included: auditory discrimination, recognition of written symbols, and

communicative interactions. These variables were not evaluated due primarily to the time constraints of the study. Because of the delay in project initiation (the children were not actually started on the Verbotonal method until January), an excess of time spent in measurement would have infringed upon the time remaining for instruction. Therefore, those measures which were deemed most critical were given priority. In addition, for many of these variables (both the ones measured and those not measured) existing tests either were lacking or were inappropriate for the age and handicap of these subjects, so that time was required to modify or to develop more discriminating instruments, as was the case with the Preschool Speech Production Test.

In part, the Speech Production Test was also a test of auditory discrimination, as the subjects were imitating what they heard. In particular, reproduction of the first 19 items (phonemes and duplicated syllables which were not pictured) was dependent upon auditory discrimination of the items. However, a more sharply delineated measure of auditory discrimination would provide more meaningful information and will be included in the continuation study. Measures of written language recognition and of communicative interactions (via interaction analysis) are also considered meaningful and will be included in the fall project.

B. Training of Verbotonal Teachers--Evaluation Procedures

Evaluation of the training of teachers in the Verbotonal approach involved four components: (1) delineation of Verbotonal methodology; (2) assessed competence of the American teachers in the Verbotonal approach; (3) reactions of the American teachers in training and (4) reactions of the Yugoslavian teacher trainers. These were determined by the following procedures:

1. Video tapes were collected for group and individual activities in both Verbotonal and conventional groups and of both the Yugoslavian trainers and the teachers in training. These tapes provide documentation of the Verbotonal approach and demonstrate differences between Verbotonal and conventional methodology. In addition, they provide a measure of the ability of the American teachers to use the Verbotonal method, and during the training they provided those teachers with immediate feedback on their performances.

2. In-service sessions provided opportunities for ongoing evaluations. These sessions were held after school three days per week and gave the teachers in training opportunities both for initial learning about the Verbotonal theory, its rationale and routines, and for discussion and feedback on their interpretations and applications of the approach.

3. A teacher reaction form was distributed to the teachers in training to help evaluate their attitudes toward the approach. A copy of this form is included in Appendix F.

4. Informal evaluation by the Yugoslavian trainers was requested to determine their satisfaction with the abilities of the American teachers to implement the Verbotonal approach.

Results

A. Communication Performance

1. Accuracy of Speech Production. Comparative data from the 44-item Preschool Speech Production Test (vocalization, babbling and words) were analyzed for 33 children (16 experimental and 17 control) out of the original population of 50. Scores for the remaining 17 children were not available due to absences during the testing period and, in a few cases,

due to failure of some children to respond at all. The data on accuracy of speech production, i.e., similarity of child's production to the spoken stimulus of the teacher, were analyzed for group comparison in four ways:

(a) A one-way, single classification level analysis of variance was run in which the two treatment groups--Verbotonal and conventional --were compared on the dependent variable measure of speech production scores. Both groups were compared at pretest and posttest. On this measure, there were no significant differences between groups in either time interval, although a distinct trend favoring the Verbotonal group becomes apparent at posttest.

(b) A two by two analysis of variance was used to compare the speech production scores of the two treatment groups at two levels (high scorers and low scorers) of each of the five designated variables (chronological age, hearing loss, pretest intelligence quotient, pretest lipreading scores, and pretest social competency scores). These comparisons were made separately for pre- and posttreatment scores.

The basic equivalence of both groups at pretest was indicated by the low "F" ratios. No interaction effects between groups and independent variables were evident by the analysis as performed. No significant differences resulted from the preceding analysis between groups. But, significant difference in the speech production scores of the Verbotonal group as a consequence of high and low subjects in lipreading and social competence was evident. A two by two analysis of variance by the two levels of lipreading resulted in a significant "F" ratio of 4.93 for the pretest and 5.85 for the posttest. The same analysis utilizing two levels of social competence resulted in significant "F" ratios of 6.92 for the pretest and 7.42 for the posttest. (Analyses are reported in appropriate tables in Appendix G.)

A difference between treatment groups was noted in comparing the speech production score gains (from pre- to posttest) made by the high vs. the low scorers in both competency and lipreading. For both groups and for both variables, the high scorers in social competency and in lipreading scored higher in speech production than the children who scored low on these variables, although the latter difference was more marked for the Verbotonal group. For both groups and at all levels, posttest speech production scores were higher than the pretest scores. However, for both variables at high and low levels of competence, the Verbotonal group made greater gains in speech production scores than did the control group. It may particularly be noted that the speech gains made by the Verbotonal children who were high scorers in social competency and by those who were high scorers in lipreading were approximately twice those of the high scorers in either skill for the control group (a gain for high social competence scorers of 15.67 points for the Verbotonal group vs. 6.50 for the control; a gain for high lipreading scorers of 16.75 points for the Verbotonal vs. 8.22 for the control). This high differential was not evident for the low scorers on either variable, although the net gain favored Verbotonal. (See Appendix G, Tables II and III.)

(c) An analysis of variance on gain (posttest minus pretest) scores was suggested on the basis of the differential effects noted above. The results of this analysis, in which each member in each group is used as his own control, showed that improvement in speech production for the Verbotonal group was significantly greater, beyond the .001 level, than for the control group. The mean gain score for the Verbotonal group was 14.9, for the conventional group, 8.9. (See Appendix G, Table IV.)

(d) A regression analysis of the variables measured in this study was run both pre- and posttest to provide additional information on the direction and magnitude of these relationships, and to provide preliminary information on the comparison of the various measured characteristics to a child's success with the different educational treatments. As in the previous measures, the dependent variable under consideration was speech production, the independent variables designated as age and pretest measures of hearing loss, intelligence, lipreading and social competence.

Regression analysis was done both pretest and posttest for the dependent variable of speech production with the independent variables being pretest measurements of IQ, hearing loss, lipreading, social competency and chronological age. The total group was considered at both time intervals, as were the Verbotonal and conventional segments individually. In the total group, 33 subjects were used. In Verbotonal, there were 16 youngsters; 17 subjects were in the conventional group.

For the total group at pretest, the following partial correlations were significant at the .05 level of confidence: speech production and hearing loss (negative relationship), speech production and lipreading (positive relationship), both variables accounting for .443 of the variance (.474 of the total variance in speech production scores being accounted for by all the independent variables). Of the two--hearing loss and lipreading--the latter appears to account for much of the variance. The importance of these two variables in terms of predicting speech production scores for the entire group is easily seen.

When pretest speech production scores are studied as they relate to the independent variables, and the total group is viewed individually as Verbotonal and conventional, the following relationships are evident:

In the Verbotonal group, the two critical independent variables (as a consequence of high relationships to speech production) appear to be lipreading skills and social competence. Both account for a total of .619 of the explained variance (fraction of explained variance equals .624 when all the independent variables are considered). When hearing loss is eliminated, social competence appears to account for much of the explained variance, which indicates a considerable relationship with the ability to produce speech.

Within the control group at pretest, the two critical independent variables appear to be hearing loss and lipreading, which correspond to those relationships evident when the total group is studied. With

none of the independent variables eliminated, the fraction of explained variance is .618. Lipreading skills and hearing loss account for a total fraction of explained variance of .608; hearing loss appears the most critical.

At posttest, the relationships between variables as they affect the full sample appear somewhat similar to the pretest results. Again, the factors of hearing loss and lipreading skills appear to account for most of the explained variance.

The Verbotonal group displays an increasing dependence on social competency in terms of speech production scores. The contribution of lipreading remains relatively constant to that indicated at pretest. Hearing loss as related to the speech production of the Verbotonal group appears to account for the least amount of variance.

Within the conventional group, as at pretest, the importance of hearing loss in the production of speech appears as significant as it did during pretest. A negative relationship between speech production and social competence emphasizes the differential role played by this variable within the two groups. As indicated earlier in the discussion, one is at a loss to explain this difference, particularly at the outset of the investigation.

2. Speech Quality. For the measures of strength and pitch on the Preschool Speech Production Test, no significant differences were found --neither from the analysis of variance of comparative pre- and postspeech production scores, nor from the analysis of variance of gain scores. In the latter, however, a trend toward better vocal quality was evidenced on the part of the Verbotonal group.

Additional subjective information may be added relevant to the variable of speech quality. Observers who were familiar with the speech of preschool deaf children were in general agreement that, in addition to vocalizing more frequently, the Verbotonal group evidenced more normal intonation patterns and pitch contours than the traditionally trained children.

3. Connected Speech. Although this test promised to be valuable in assessing speech quality--pitch and intonation contours--problems in administration reduced its value for the present project. During the pretest, the administering teachers did not attempt this test, nor did they

complete it if they felt it was beyond the comprehension of the children. Therefore, the number of children answering was small.

At posttest, teachers were specifically instructed always to present and complete the test, as well as the Speech Production Test for phonemes and words. Therefore, at posttest time, all the children were given the connected speech inventory. Although data on gains is not available because of the missing pretreatment inf rmation, additional comparisons between the posttest connected speech scores of the Verbotonal and control groups are meaningful.

A single classification, one-way analysis of variance was done using the results from the connected speech inventory, along each of the following dimensions: strength, pitch, intelligibility and intonation. For strength and pitch, a trend is discernible favoring the Verbotonal group with "F" ratios higher than those evident in the measurement of these variables using the phoneme and word lists. For intelligibility, the "F" ratio (7.04) is significant beyond the .05 level. Similarly, the "F" ratio (5.53) between groups on the measure of intonation far exceeds the probability level of .05. The mean scores for the Verbotonal group regarding the dimension of intelligibility and intonation are 66.66 and 84.13 respectively; for the traditional groups the means are 30.59 and 48.53. (See Appendix G, Tables V, VI, VII, VIII.)

4. Lipreading, Social Competence and Intelligence. For the variables of lipreading, social competence, and intelligence quotient, no significant differences between treatment groups were discovered either for the pre- or posttest scores or for the gains from pre- to posttreatment. As significant differences on these variables might be realized during a longer period of time, their measurement will be continued in the Verbotonal 1971-72

project. For the present project, these measurements were important in terms of the analysis of groups and the interactions of these variables with speech production, as cited above.

B. Teacher-Training Evaluation

1. Video Tapes and In-service Sessions. The results of the video taping and of the in-service sessions are at present available only in the form of subjective comment. According to both the teachers and the trainers involved, the tapes and sessions provided valuable information and feedback for implementation of the Verbotonal approach. The tapes are still available, as a permanent resource, both for delineation of Verbotonal methodology and for training of teachers in the future. Over 20 hours of tapes on the Verbotonal method have been made available by this project.

2. Teacher Reaction Form. According to the results of the questionnaire to determine teacher reaction, teachers perceived the most desirable aspects of the Verbotonal approach to be:

(1) positive results (despite a short period of exposure) in children's speech production;

(2) enjoyment of the activities by the pupils;

(3) apparent effectiveness of Verbotonal body movements to elicit speech;

(4) effectiveness of the equipment;

(5) concentrated efforts toward speech quality;

(6) presentation of language through phrases and sentences, rather than isolated sounds;

(7) less frustration for the child, despite the more exacting requirements of the method; and

(8) comparative simplicity of method.

According to teacher perceptions, the least desirable aspects of the Verbotonal method were:

(1) constant repetition without much variation in presented lessons;

(2) necessity for all persons involved to "jump around" and to "spend most of the day on the floor";

(3) limitations in teaching activities for individual teacher (While the group teacher, who works with six to eight students, may choose from a number of activities, the individual teacher working on a one-to-one basis has fewer options.);

(4) need for supportive services, particularly with the multiple handicapped; and

(5) regarding teacher-training experience--lack of constructive criticisms offered when observer teacher is teaching.

Additional responses sought from the teachers involved those aspects of the Verbotonal method which proved easiest for them and for their students, and which proved most difficult. Teacher difficulties included the areas of:

(1) creating nursery rhymes;

(2) feeling comfortable with body movements;

(3) developing self-confidence in the method as a whole;

(4) using the microphone holder; and

(5) associating correct body movements with specific sounds.

Child difficulties perceived by the teachers;

(1) body movements;

(2) the need for excessive memory skills; and

(3) the need to listen very carefully

Additional teacher comments:

(1) the use of the Suvag equipment provided no obstacles;

(2) older children appeared to use spontaneous phrases easily; and

(3) children talked more and appeared to enjoy the body movements.

The teacher reaction form will be utilized again during the continuation phase of the project. Information received from the first reactions provided excellent materials for in-service sessions, which are helping to alleviate the expressed difficulties and are useful for additional clarification of the contrasting methods.

3. Yugoslavian Trainer Reactions. According to the Yugoslavian trainers, the progress made by the American teachers was very satisfactory. In general, it was felt that sufficient expertise was gained by the four teachers in training to enable them to function with less supervision by trained Yugoslavians for the coming year, and to assist in the training of the additional teachers required for the 1971-72 Verbotonal demonstration project at the Western Pennsylvania School for the Deaf.

C. Constraints on Interpretation of Results

The above results must be considered tentative in view of the various limitations of this study:

1. Project Length. Time for program implementation was shorter than originally anticipated, so that actual treatment time between pre- and posttest periods was only four months.

2. Instrumentation. Constraints of time, further complicated by the late beginning date, required that many of the intended measurement activities be modified or curtailed in order that sufficient time could be allotted to the training of teachers and the observing of teachers working with the children. This latter concern precluded testing of children as often as contemplated, or at the most appropriate time. In addition, as noted above, many of the existing instruments are inadequate and the development of an appropriate and discriminating evaluation protocol for preschool deaf children still demands considerable time and analysis.

3. Test Administration. Administration of tests was not optimally rigorous due to difficulties in establishing rapport between the children and the testing personnel and due to inconsistencies in teacher administration of the measures (e.g., inconsistent decisions on how long to continue testing, how often to repeat the stimulus and problems of differential characteristics in the teachers' voices when they offered the stimulus word). Also, because of illness or failure to respond, only 33 of the original 50 subjects were tested at both pre- and posttest periods. However, the attrition rate appeared equal for both groups. From experience in this project, it is suggested that an independent evaluation team be used in the 1971-72 project.

4. Subject Transfer. Although the children were originally assigned by random number to the experimental or control groups, a discipline problem with two of the experimental children required reassignment --with the two disruptive children transferred to the control group setting and two other children transferred to the Verbotonal setting. Although the four transferred children were not included in the statistical analysis, the original random sampling no longer remained precise.

Summary and Conclusions

The present project was systematically applied and provided concentrated training in the Verbotonal approach in an attempt to ameliorate the weaknesses in communication performance observable in preschool deaf children. The results of this program indicate that an initial step has been made in improving that performance. Some tentative conclusions may be offered.

Comparative data suggest that the Verbotonal group, despite the short length of intervention, exceeds the controls in ability to produce speech

in terms of quantity and quality. The former is evident when an analysis of variance involving gain scores on the phoneme and word lists indicates a significant "F" ratio in favor of the experimental group. A trend is evident regarding better functioning by the Verbotonal group in speech quality, though not significant at the .05 level.

When data from the connected speech inventory are used in a single level, one-way classification ANOVA, significant differences favoring the Verbotonal group are evident along the dimensions of intelligibility and intonation, and distinct trends in favor of the Verbotonal are seen in measures of strength and pitch.

When two by two analyses of variance are utilized on speech production scores across treatment groups and two levels of each independent variable, no significant differences were found across the main effects of treatment at pretest. The main effects of two of the independent variables, lipreading and social competency, appeared significant.

At posttest, the main effects of the treatment group revealed higher "F" ratios than at pretest, but none significant at the .05 level. The significant effects of lipreading and social competence are again evident.

No significant interaction effects were revealed, either at pretest or posttest, involving any of the variables.

When the mean speech production scores in the various cells were scrutinized, the differential effect of the independent variables of lipreading and social competency across groups is evident. The mean scores of the Verbotonal group show the greater gains. Perhaps the reciprocal nature of these competencies--lipreading and social skills--with that of speech production is indicated. In any case, the Verbotonal treatment appears to offer a setting in which skills in lipreading and social competence can be more effectively utilized.

Regression analysis was performed to pursue the differential role played in the production of speech by the independent variables of IQ, hearing loss, lipreading skills and social competency and chronological age. The pretest speech production scores are studied as they relate to the independent variables. When the total sample is viewed individually as Verbotonal and conventional, the following relationships are evident. In the Verbotonal group, social competence accounted for most of the variance; whereas, in the conventional group, hearing loss accounted for most of the variance. The effect of lipreading ability was comparable for both groups. When posttest speech production scores are related to the independent variables, no differences are evident for the group as a whole with these relationships holding at pretest. But in the Verbotonal group, social competency remains a more important factor in predicting speech production than for the control group as it did at pretest; and hearing loss again has less relationship to speech production than for the conventional group at posttest. The latter differential becomes greater in the posttest results.

As a consequence of the interventions, it would appear that at posttest the speech production scores of the Verbotonal group are less dependent on hearing loss than are those of the control group, and that speech production scores are increasingly more dependent on social competence than for the controls. At this early stage of the investigation, it is difficult to assess the differential effects of the independent variables on speech production of the two groups. Some concern needs to be given to a more extensive evaluation of the speech production instrument, the lipreading inventory and the various means utilized to assess hearing loss. Problems are compounded because of the early age of the subjects and the lack of

appropriate instruments which preclude validity examinations by comparing scores on instruments designed to measure similar skills.

Discussion

In view of the many problems confronting investigators in the area of auditory training for preschool prelingually deaf children, a heuristic posture is necessitated regarding data accumulation and analysis.

Relative to the questions involving teacher training and subsequent teacher functioning in the classroom utilizing the Verbotonal system, evidence accumulated by observations, comments of both teachers and trainers and by video tapes would indicate a fair measure of success. In-service sessions proved useful. Teacher feedback was immediate and enhanced acquisition of competency because of the availability of over 20 hours of video tape. Teacher trainees spent full school days observing experienced Yugoslavian teachers working with the children in group and individual sessions.

It is felt that sufficient expertise was gained by the four teachers in training to enable them to function with less supervision by trained Yugoslavians for the coming year and to assist in the training of the additional teachers required for the coming school year. Video taping is again planned for quite extensive coverage of both the classroom activities and the in-service training sessions. Teacher trainees will be taped as they perform in the classroom for their own use and for evaluation of their performancy by those Yugoslavians who will be associated with the project in the fall.

Regarding the various analyses performed on the data available as a consequence of the beginning study, numerous limitations need to be discussed.

It became apparent at the outset of the study that, due to severe constraints of time, further complicated by a late beginning date, much of the intended measurement activities needed to be modified or curtailed in order that sufficient time could be allotted toward training of teachers and observing teachers working with children. This concern precluded testing of children as often as contemplated or at the most appropriate time. The needs of the children, as a consequence of handicap and age and the difficulty in establishing the proper rapport between children and testors, necessitated changes and some inconsistencies in administering the measures (since the classroom teacher needed to be utilized, rather than an independent team). Illnesses of the children, and at times an inability or an unwillingness to respond, caused serious gaps in the testing outcomes. However, despite the fact that statistical analysis had to be based on 33 children of the total sample of 50, the loss of subjects was equally distributed between groups.

The initial uncertainty as to the feasibility or meaningfulness of the various measures in the evaluation protocol and the inability to pursue means of effecting validity and reliability contributed to serious misgivings regarding the data. Where a decision had to be made between the alternatives of maintaining training schedules or enhancing scientific rigor in terms of the data, the former alternative was chosen. Thus, when it became apparent that two disruptive youngsters in the Verbotonal group were creating problems in teacher training, the youngsters were removed. When it became apparent that youngsters would respond only to their teachers, various inconsistencies in terms of time given for the administration of the tests, differing teachers' attitudes as to when to stop the testing, or how often to repeat the stimulus need to be taken into account

when evaluating data. The fact that differential characteristics of the teachers' voices could affect speech production scores is also being considered. The realization that the entire intervention period lasted for merely four months of a school year must not be overlooked.

Although the data are useful in suggesting means to modify instruments, in pointing out a more feasible and economical methodology for data gathering and analysis, and for reasonable estimates as to differential functioning between treatment groups, their use at this stage need to be reinforced by other evidence. Of some use at the present are the subjective impressions of parents, teachers and other staff members, and visitors which appear consistent in their agreement that the children in the Verbotonal groups appear to vocalize more and with better quality speech than what is usually typical of those youngsters. (See Appendix H for comments.) Video tapes appear to reinformce these impressions.

On the whole, conclusions, though tentative, indicate a marked degree of effectiveness of the Verbotonal methodology when compared with a conventional program and would suggest, at the very least, a continuation of the project, with concerns aimed toward alleviating the limitations as their effects become known. Serious thought should be given toward training an evaluation team whose members would administer all the tests to all the children. Where lengths of tests can be reduced without loss of information, this procedure should be followed. All audiograms ought to be the responsibility of one person in view of the fact that semantic descriptions of the extent of hearing loss appear often in the children's records. New audiograms need to be determined at the start of the fall project. Instruments need to be prepared in those areas not investigated in the beginning study and several appropriate academic achievement measures ought to be included.

The measures included in the earlier evaluation protocol which have not been developed ought to be utilized. These would include: The Craig-Collins Interaction Analysis, the Gesell Scales of Physical Mobility and Reflexes and additional measures of auditory discrimination.

Additional phrases and sentences need to be included in the speech production tests as four of the 24 children scored in the high 50's (possible highest score--66) and also to permit continuing evaluation of intonation and rhythm as dimensions of speech quality.

The use of media (TV and audiotape) appear useful in documentation, validation, feedback and dissemination.

The training of American teachers can be accomplished as part of daily classroom activities when new teachers are observing trained teachers in the classroom actually working with the children through the school day and at least three hourly meetings after school per week for one semester are utilized for in-service.

Teacher training should be continued to increase competency and to provide information to new teachers in terms of suitable materials as the child's school life continues. Video tapes can be used extensively for training and for documentation.

Regarding a suitable statistical technique, analysis of covariance using pretest scores of all variables as covariates is suggested. Lip-reading skills, social competence and intelligence quotient should be considered as dependent variables as growth is conceivable, and changing impacts on speech production can be evaluated. The use of repeated measures of the multivariate type can provide additional information which should prove useful for follow-up evaluations.

BIBLIOGRAPHY

Anderson, Ursula M. "The Incidence and Significance of High Frequency Deafness in Children," American Journal of Diseases in Children 113:560-65; 1967.

Babbidge, Homer. Report to the Secretary of Health, Education and Welfare. Advisory Committee on the Deaf, Washington, D.C.: 1965.

Beebe, H. and D. Weiss (eds.). The Chewing Approach in Speech and Voice. Basel, New York: S. Karger Company, 1951.

Birch, Jane R. and Jack W. Birch. "Predicting School Achievement in Young Deaf Children," American Annals of the Deaf 101:348-52; 1956.

Briskey, R. J. et al. "Effects of Hearing Aids on Deaf Speech," Audecibel 16:173-88; 1967.

Craig, William. "Hearing Impairment," in Johnson and Black (eds.) Exceptional Children Research Review, Washington, D.C.: Council for Exceptional Children, pp. 135-80, 1968.

Froeshels, Emil and H. Beebe. "Comments Concerning the Verbotonal Method," Volta Review 71:438-40, 1969.

Guberina, P. "A New Method in Education and Reeducation of Hearing." Specigalna Ykoia. Beograd, 1961, No. w (in Serbo-Croatian).

Guberina, P. "Methodology of Verbotonal System." (Lecture delivered on Yugoslav Symposium on Rehabilitation of Persons With Impaired Hearing, in Zagreb, 20-22. May, 1965) (in Serbo-Croatian).

Guberina, P. "Problems of the Auditory Rehabilitation of Deaf." Yugoslav Congress on Rehabilitation, Beograd., October 1965. (in Serbo-Croatian).

Guberina, P. "Tonal and Vocal Audiometry in the Light of Verbotonal Audiometry." II World Congress of Deaf, Zagreb, 1955.

Guberina, P. "Verbotonal Method and Its Application to the Rehabilitation of the Deaf." Report of the Proceedings of the International Congress on Education of the Deaf, Gallaudet College, Washington, D.C., 1963. U.S. Government Printing Office, Washington: 1964.

Guberina, P. "Verbotonal System: Structuring of Hearing on the Basis of Combining Factors of Frequency, Intensity, Time, Tension and Pause." Symposium, Hearing, Voice, Speech. 1. October - 5. October 1962 (in Serbo-Croatian).

Bibliography (Con't)

Guttman, Newman et al. Articulatory Training of the Deaf Using Low-Frequency Surrogate Fricatives. Interim Report. Naperville, Illinois: Bell Telephone Company Laboratories, 1969.

Quigley, Stephen P. "The Deaf and Hard of Hearing," Review of Educational Research: Education of Exceptional Children 39:103-23; 1969.

Redell, Rayford C. and Donald R. Calvert. "Selecting a Hearing Aid by Interpreting Audiologic Data," Journal of Auditory Research 6:445-52; 1966.

Rosenstein, Joseph. "The Deaf and Hard of Hearing," Review of Educational Research 36:176-98; 1966.

APPENDIX A

FURTHER DESCRIPTION OF THE VERBOTONAL METHOD

Means and Art of Introduction of Speech Material and Grammar

For the 1st and 2nd Level
Compiled by: Branka Gabric

I. Level

(1) Objects and toys
(2) Children and toys
(3) Role playing
(4) Very simple situations in pictures

II. Level

(5) Complex situations in pictures
(6) Short stories in pictures
(7) Describing pictures
(8) Film stories

Examples

I. Level

(1) Introduction of "hi" through objects and tovs.

Children or teacher takes a toy representing Mommy and another one representing Daddy. The toys come from opposite directions, and when they meet, the say "hi" to each other.

(2) Introduction of "eat" through children and toys.

The child has different toy animals and distributes food to them always telling the toy: "Eat puppy," "Eat bunny," "Eat lamb," etc.

1970-71

A Curriculum Guide for Verbotonal Method

Initial Group--Children 2-3 years old

For such young children we can plan only very globally. Our goal will be:

(1) stimulating the vocalization (children who didn't vocalize before).

(2) memorizing and correcting the sounds which the children already had at the arrival. Stimulating the spontaneous speech through implementation and play activities.

Appendix A (Con't)

(3) stimulating the vocalization of new sounds and development of the speech.

The activities will be:

A. speech through play activities.
B. musical stimulations.
C. body movement stimulations.
D. handwork according to the age and motor skills of the child. (arts)
E. development of general motor skills.
F. auditory channel.

(A) Speech through play activities.

While working with the children, we use as technical equipment the electronical machine Suvag I, crystal microphone, vibrator VIBRA--Suvag or headphones KOSS (what depends on the residual hearing).

In the beginning we often use with the youngest children a wooden board because we do not want to force the children to accept the headphones or the vibrator. Therefore, we leave them free, and we apply the vibrator on the wooden board. This way of using the vibrator gives us plenty of possibilities to stimulate the vocalization.

--Speech material--

Babbling:
woo-woo (barking)
moo-moo (mooing)
poo-poo (bathroom)
boo (peek a boo)
boom (shooting)
um-um (eating)
up-up (jumping)
baa-baa (lamb)
etc.

Emotions:
aaa (joy)
oh (surprise)
u (pain)
etc.

Syllables: PA BA MA TA VA LA and other vowels.

Words: mummy, my, man, more, mop, move, bowl, bee, baby, bye-bye, bad, boy, bus, bow, boat, bed, bear, bite, blue, pop, pa, up, puppy, pie, peep, pea, purple, play, pour, tap, toe, toy, tie, meat, boot, top, two, too, time, tip toe, tommy, out, eat, tell, pat, love, we.
etc.

The speech material will be selected according to the age and interest of the children. (Everyday situations.)

Appendix A (Con't)

(B) Musical stimulations.

The aim of the musical stimulation will be the same as in "speech through play activities." By making use of nursery rhymes and rhythms, we will try to achieve this aim. In the nursery rhymes and rhythms, we will use the same speech material according to the phonetical progression.

(C) Body-movement stimulations.

The goal of the work is again the same. Because the children are very young, we will work through games. The rhythmical movements must take account of the children's motor abilities. The development of speech through play activities is in the beginning very difficult to distinguish from body-movement stimulations.

(D) Arts--Handwork.

Development of child's capability to express himself through arts and handwork.

(E) General motor skills.

Development of sense of the group. Child's awareness of the space and its orientation in the space. Observing of the motor development of the children and developing of motor skills with children who have motor troubles. These are the aims of this activity. The activity includes all forms of locomotion and space actions, also ball games.

(F) Auditory channel.

The speech material which we are introducing to the children will be also tested through the auditory channel (without lipreading) as far as the maturity of the child allows it.

Speech Material Used by the Verbotonal Method with the Deaf Preschool Child

Sound P

(A) Minimal Speech Material

Syllables: pu, pa, pea, poo, po

Words: pop, up, puppy, pie, pa(father), peep, poo-poo, pea, pen, pull, pool, pour, pow, pet, purple, please, push, open, pain, play, pick,apple, pig.

Sentences: Pop up. Puppy up. Pie up. Peep up. Pen up, etc. Pour pop. Pow! Pow! Pow! Pet puppy. Please pie. Please puppy. Please apple, etc. Push puppy. Play pa. Pick apple. Pick pen, etc.

Appendix A (Con't)

(B) Proceedings

(1) Group Work

a) General motor skills

b) Body-movements stimulation
(see Phonetic Rhythms by N. Martinov)

c) Musical stimulation
(see Phonetic Rhythms by N. Martinov)

d) Speech through play activities (Implementation)
(some examples of the speech development through play activities.)

Implementation of UP

1. Use a cardboard box with the top cut so it opens. Children take turns in coming up and saying, "UP."

2. Have the children pick up an object and say: "UP."

3. Build tower with blocks while saying "up" when you place one block on top of the other.

4. Toy fire engine with ladder. Fireman climbs ladder while saying, "up."

5. Acrobatic monkey--as child squeezes it say, "up."

6. Jack-in-the-box.

7. Pop (hit) the ball.

8. Use puppet to move at the command of "UP." (Invent more play situations.)

Implementation of PUPPY

1. Use live puppy or a hand puppet.

2. Let the children imitate a puppy.

Implementation of POP and PIE

Imitate the chicken by saying, "Peep." Use puppets, toys or a live chicken. (Invent more play situations and speed situations.)

Implementation of PICKUP PUPPY, APPLE, PIE, etc.

The teacher drops a puppy and says to a child, "Pick up puppy." The child picks up the puppy and places it down again and says to the other child, "Pick up puppy" and so on with different objects too. (The children must stay active all the time.)

Appendix A (Con't)

Implementation of POUR POP

Children say to each other, "Pour pop" while pouring pop.

Implementation of PLEASE

Children are sitting in a circle. Each one holds an object. The teacher asks, "Please puppy." The child hands over the object, and then that child asks further. (The child can also take over the role of the teacher and take over the microphone of the teacher.)

e) Arts (beginning groups)

1. Water colors spread over the paper with top of finger.

2. Forming of plasticine.

3. Colored ink spread over the paper with matches.

4. Tearing paper and gluing it into forms determined by the teacher or invented by the child.

5. Coloring pictures.

f) Auditory channel

In the group, the hearing of the child will be tested also. From time to time we will control how much of the speech material introduced to the child it can identify without lipreading, but just over the auditory channel (Suvag I or II + microphone and vibrator or headphones or together.)

Example: Each child has a different object. The teacher talks into the microphone (without children seeing his lips) saying, "Please puppy." The child holds the puppy and that particular child gives it to the teacher. This indicates that he heard the question.

(2) Individual Work

(See "Individual Work" by B. Gabric)

APPENDIX B

A BRIEF DESCRIPTION OF A CONVENTIONAL APPROACH

The traditional approach utilizes conventional methodology and standard audiometric equipment as presently employed by the Western Pennsylvania School for the Deaf.

Many of the traditional type programs in oral education for the deaf have been referred to as a multi-sensory approach. Methodologies are geared toward use of the residual-hearing of youngsters and the use of other sensory modalities. Activities, materials and sequencing usually take the form of introducing practice in various forms of activities involving syllables, words and sentences.

The conventional approach involves a nine to three school day. The youngsters will be divided into play groups of eight children, each with a trained teacher of child development who will bring to the child the same type of program he would have if he attended a nursery school with his hearing peers. Each group will be also assigned a tutoring teacher, a trained teacher of the deaf who will give the instruction in speech, lipreading and auditory training involving Warren or similar equipment. The tutoring teacher will work with the children on an individual basis, taking the child from the play group into a smaller tutoring room. When that child loses interest or in some cases completed his lesson, he will be returned to the play group--there will be a constant rotating of pupils for individual work and some things, i.e. rhythms, will be done as a group project with both teachers. The teaching philosophy and procedure may be described as follows:

"Tutoring is fun, never force amplification. If they don't like what you present, change it. You must motivate the child to like tutoring--they cannot be forced. Remember always--playing is a child's business--but they can learn through play. We follow a regular curriculum, each child being taken at his own pace.

"It is very hard to divorce speech, languages and reading, each is a part of the whole. Speech has been defined as the ability to enunciate, but speech is more than just being able to talk. Speech means articulation, the ability to say words so that someone else will understand them. You have to want to talk and you have to have something to talk about. So before we teach the young beginning child too much articulation, we must give him the desire to talk and something to talk about. True understanding must come before speech. When our little children come to us, for the most part, they have neither speech nor language simply because they have never heard the spoken word. We begin by exposing the child to speech through sight and touch, to the way it looks on the lips and to the way it feels with his hand on the speaker's face. A hearing child hears a word many times and it has become meaningful to him before he makes an attempt to

Appendix B (Con't)

articulate it; so we feel that the deaf child should have the opportunity to see and to feel a word and through lipreading to understand the meaning of the word before we expect him to say it.

"If we hear, we will get speech and language through our ears. The deaf child can learn to understand what is said to him by reading the lip movements of others and eventually can learn to talk through imitating these movements which he sees and the vibrations which he feels on his teacher's face. Of course, he can also learn to express himself by hand movements--and to understand by reading the hand movements of others.

"Lipreading is defined as the ability to understand primarily through visual clues, words, phrases, or sentences said by another person. The largest number of clues for understanding come from the movements of a speakers mouth; in addition, facial expressions often help in the lip-reader's interpretation. Clues relating to a given time or situation, etc. may also be factors in aiding the lip-reader. Lipreading is a part of the whole of understanding language--for our purposes, they are synonymous. In the young child lipreading is the basis of language.

"Lipreading is our first rung. How do we recognize readiness for lipreading? We begin with complete unawareness of verbal communication then beginning awareness of verbal communication in a vague way; a fleeting glance, the child begins to see that mouth movements differ--then the direct purposeful look. In formal lipreading development a few specific rules are given:

1. Show a child what you are talking about.
2. When the child looks, say something meaningful.
3. No tapping--no pulling of face.
4. Get on child's level--not more than five feet, no closer than two feet.
5. Keep head and hads still.
6. Speak clearly--use good English--no baby talk.
7. Use complete sentences.
8. Enunciate key word, but do not exaggerate.
9. Don't expect the child to repeat accurately--accept anything and show pleasure.
10. Do not force the child into formal sessions. Remember, this may be fun--a pleasant experience--if a child ever takes a dislike, the teacher has "had it." Love, courage, patience and a sense of humor are the prerequisites for teaching young children."

Appendix B (Con't)

"We really begin reading readiness at the preschool level. This is more commonly known as sense training. This is the outgrowth of work done by Madame Montessori and known as the Montessori Method. It is built on the premise that the young child leans heavily on first hand sensory contacts to explore the unknown and refine that which is familiar. The opportunity is given to handle all kinds of simple materials inherent in simple sensory learnings. Concepts of big and little, smooth and rough, sweet and sour, color--shapes; dressing frames are used for simple dressing processes that are isolated for practice and control of those hand motions most difficult for beginners. All concepts to be discovered, clarified and refined over and over again.

"Our children are very enthusiastic learners and therefore make many mistakes by the wayside. All teachers try to soften these blows as much as possible with a positive approach so that this enthusiasm remains. But a teacher also expects a rather high degree of performance which means thorough comprehension. The children must, themselves, express the point in question. Each teacher has her own particular way of doing this, and each child is an individual."

APPENDIX C

PRESCHOOL SPEECH PRODUCTION TEST

Part I: Vocalization and Babbling

1. ah
2. oh
3. oo
4. ee
5. bbbbbbb (labial vibration)
6. pa-pa-pa-pa-pa
7. um, um, um
8. moo, moo
9. miau
10. ah - boo
11. bam, bom, boom
12. la-la-la-la-la-la
13. la-la (changing intonation)
14. tap-tap-tap-tap
15. wah-wah-wah-wah
16. du-doo-doe-dee
17. psss
18. sh
19. cah-cah ... coe-coe

Part II: Word List

20. one
21. two
22. three
23. four
24. five
25. sit
26. apple
27. Daddy
28. baby
29. ball
30. top
31. boy
32. chair
33. table
34. shoe
35. book
36. milk
37. dog
38. Mama
39. car
40. cow
41. home
42. zoo
43. girl
44. run

APPENDIX D

PRESCHOOL CONNECTED SPEECH INVENTORY

A blue ball

Two boys

A purple car

I want milk.

I see a bird.

I have a puppy.

Go to sleep.

Wake up.

Open the door.

Bye bye baby

Time to eat

Cookie, please

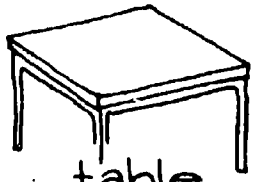
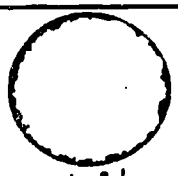
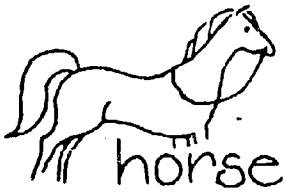
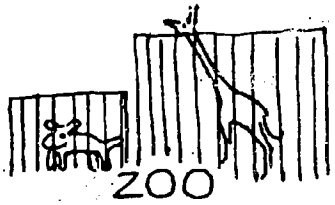
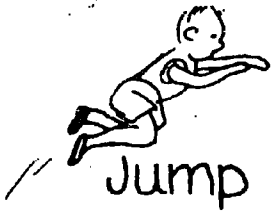
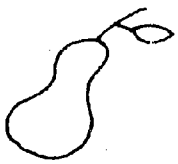
APPENDIX E

CRAIG LIPREADING INVENTORY

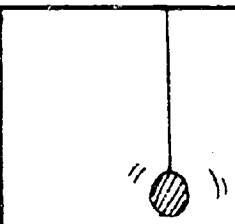
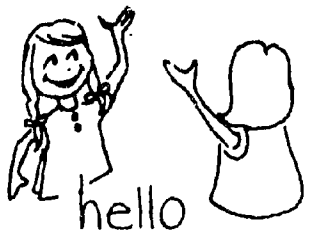
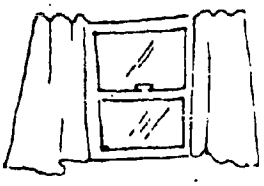
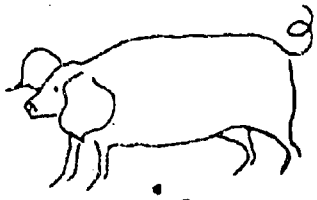
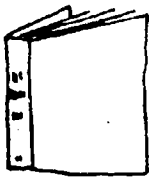
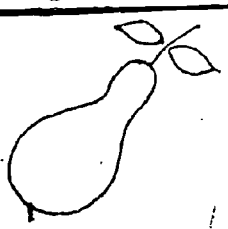
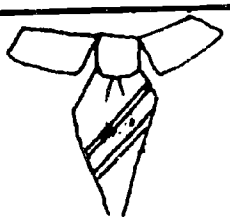
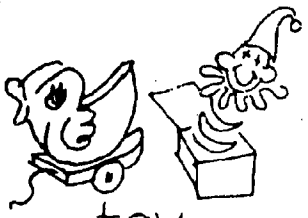
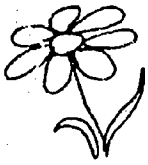
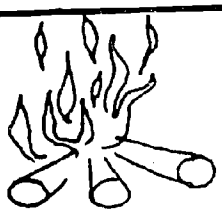
Word Recognition

NAME: _____

AGE: _____ DATE: _____ SCHOOL: _____

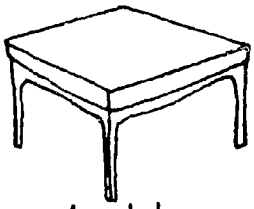
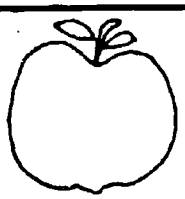
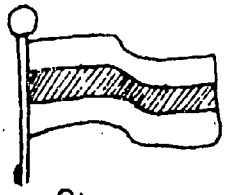
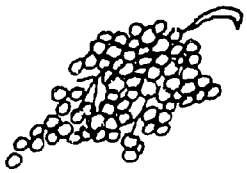
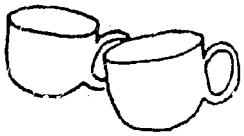
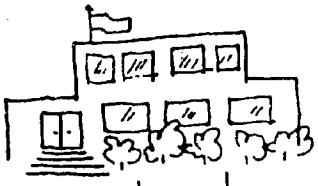
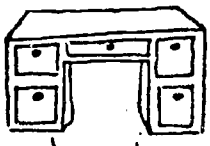
EX.	 fish	 table	 baby	 ball
1.	 kite	 fire	 white	 light
2.	 corn	 fork	 horse	 purse
3.	 two	 zoo	 spoon	 shoe
4.	 cup	 Jump	 thumb	 drum
5.	 hair	 bear	 pear	 chair

WORD RECOGNITION

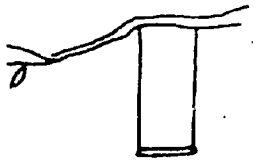
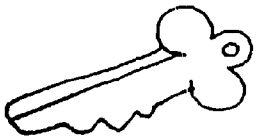
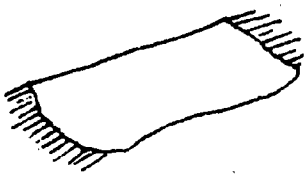
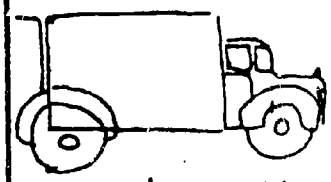
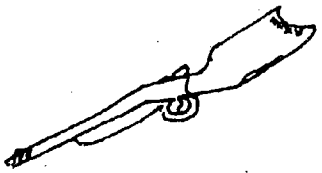
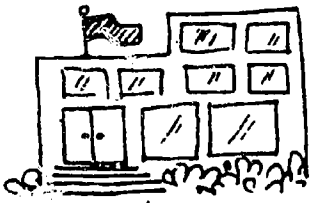
6.	 yoyo	 hello	 Jello	 window
7.	 doll	 ten	 nail	 suit
8.	 pig	 pie	 book	 pear
9.	 two	 toe	 tie	 toy
10.	 flower	 finger	 fire	 feather
11.	 six	 Sing	 Sit	 Kiss

WORD RECOGNITION

PAGE 3.

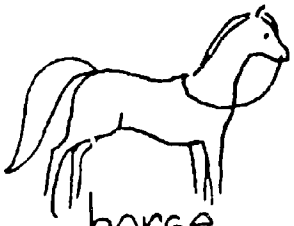
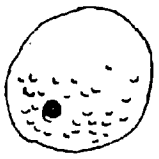
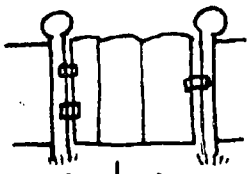
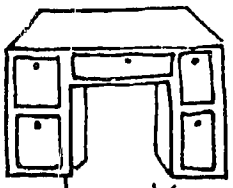
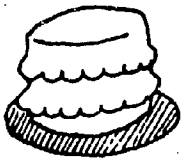
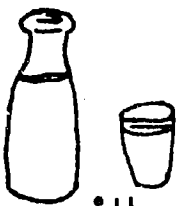
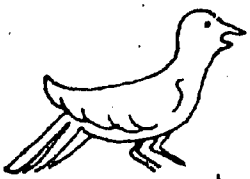
12.	 table	 apple	 woman	 rabbit
13.	 fire	 tie	 fly	 five
14.	 four	 frog	 fork	 flag
15.	 grapes	 airplane	 tables	 cups
16.	 goose	 tooth	 shoe	 school
17.	 desk	 sled	 Leg	 nest

WORD RECOGNITION PAGE 4.

18.	 dog	 sock	 star	 car
19.	 wing	 sing	 ring	 swing
20.	 three	 teeth	 key	 Knee
21.	 duck	 rug	 truck	 Gun
22.	 Moon	 school	 spoon	 boot
23.	 ear	 hair	 eye	 egg

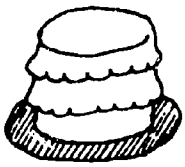
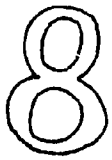
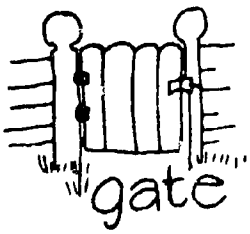
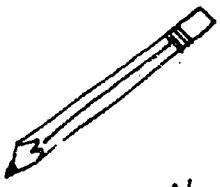
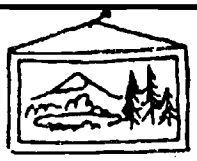
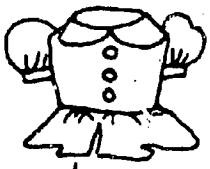
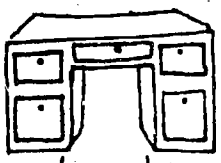
WORD RECOGNITION

PAGE 5.

24.	 horse	 house	 ice	 orange
25.	 goat	 gate	 kite	 girl
26.	 dish	 duck	 desk	 dog
27.	 cat	 cake	 gun	 coat
28.	 nail	 nut	 nest	 ten
29.	 man	 bat	 milk	 bird

WORD RECOGNITION

PAGE 6.

30.	 egg	 cake	 key	 car
31.	 eight	 egg	 cake	 gate
32.	 pencil	 picture	 mitten	 pitcher
33.	 wet	 dress	 nest	 desk

APPENDIX F

TEACHER REACTION FORM

I would appreciate your responding to the following questions. You need not elaborate on your answers unless you prefer to do so. You need not sign your name.

I. At this time and from your viewpoint as a teacher

A. What do you consider the three most desirable aspects of the Verbotonal Method?

B. What do you consider the three least desirable aspects of the Verbotonal Method?

II. What aspects of the Verbotonal Method are:

A. easiest for you to adjust to?

B. most difficult to adjust to?

III. From the point of view of the children:

A. What do you see as the most desirable aspects of the Verbotonal Method?

B. What do you see as the least desirable?

IV. A. What is comparatively easy for the child to do?

B. What is comparatively difficult for the child to do?

APPENDIX G

TABLE I

PRETEST RESULTS OF GROUPS USED AS RELATED TO AGE, IQ, HEARING LOSS, SOCIAL COMPETENCY AND LIPREADING SKILLS

	Control Mean	(N=25) Range	Experimental Mean	(N=25) Range	t
Age (In months)	50.6	36-68	53.9	36-67	1.88
IQ	100.4	74-145	96.4	78-134	1.05
Hearing Loss	78.4	65-95	78.3	63-90	0.23
Social Competency	68.7	36-113	70.1	43-92	0.48
Lipreading	10.0	2-20	10.2	1-20	0.22

TABLE II

DISTRIBUTION OF MEAN SPEECH PRODUCTION SCORES BY GROUPS, TIME OF TEST, AND BY LEVELS OF SOCIAL COMPETENCY

Groups		Social Competency* Low	High
Verbotonal	Pre	17.86	31.00
	Post	30.43	46.67
Conventional	Pre	21.77	27.50
	Post	31.54	36.00

*Low Scores--to 80 (California Test of Social Competency)
High Scores--80 and above

TABLE III

DISTRIBUTION OF MEAN SPEECH PRODUCTION SCORES BY GROUPS, TIME OF TESTING, AND BY LEVELS OF LIPREADING SKILLS

Groups		Lipreading* Low	High
Verbotonal	Pre	20.75	29.75
	Post	32.63	46.50
Conventional	Pre	19.75	26.11
	Post	30.63	34.33

*Low Scores--to 11 (Craig Lipreading Inventory)
High Scores--11 and above

TABLE IV

ANALYSIS OF VARIANCE ON SPEECH PRODUCTION PRE- TO POSTTREATMENT GAIN SCORES BETWEEN VERBOTONAL AND CONVENTIONAL GROUPS

Source of Variation	Sum of Squares	d.f.	Mean Square	F
Treatments	261.29	1	261.29	14.72*
Error	550.23	31	17.75	
Totals	811.52	32		

* .01 $F_{1, 31} = 7.53$

TABLE V

ANALYSIS OF VARIANCE ON INTELLIGIBILITY SCORES FROM CONNECTED SPEECH INVENTORY BETWEEN VERBOTONAL AND CONVENTIONAL GROUPS

Source of Variation	Sum of Squares	d.f.	Mean Square	F
Treatments	10.30	1	10.30	7.04*
Error	45.34	31	1.46	
Totals	55.64	32		

* .05 $F_{1, 31} = 4.16$

TABLE VI

ANALYSIS OF VARIANCE ON INTONATION SCORES FROM CONNECTED SPEECH INVENTORY BETWEEN VERBOTONAL AND CONVENTIONAL GROUPS

Source of Variation	Sum of Squares	d.f.	Mean Square	F
Treatments	10.93	1	10.93	5.53*
Error	61.31	31	1.98	
Totals	72.24	32		

* .05 $F_{1, 31} = 4.16$

TABLE VII

ANALYSIS OF VARIANCE ON STRENGTH SCORES FROM CONNECTED SPEECH INVENTORY BETWEEN VERBOTONAL AND CONVENTIONAL GROUPS

Source of Variation	Sum of Squares	d.f.	Mean Square	F
Treatments	22.76	1	22.76	3.29
Error	214.06	31	6.91	
Totals	236.82	32		

TABLE VIII

ANALYSIS OF VARIANCE ON PITCH SCORES FROM CONNECTED SPEECH INVENTORY BETWEEN VERBOTONAL AND CONVENTIONAL GROUPS

Source of Variation	Sum of Squares	d.f.	Mean Square	F
Treatments	13.11	1	13.11	2.57
Error	158.41	31	5.11	
Totals	171.52	32		

APPENDIX H

IMPRESSIONS OF VERBOTONAL

The following comments made by a number of persons involved in or interested in the Verbotonal project at the Western Pennsylvania School for the Deaf are included in this report since they corroborate the data analysis and are meaningful in themselves without incurring the limitations inherent in the latter. These remarks were unsolicited and were expressed by those with considerable training and experience in the field of education for the deaf.

Teachers:

"This is my sixth year of teaching the deaf. Most of them have been very discouraging years in view of the little or no progress being made by the youngsters. As a matter of fact, I had reached a decision to give up teaching. The Verbotonal method has changed my entire outlook. I am beginning to see improvement in the performance of the children to such an extent that I am most eager to continue in the field."

"I worked with C... for three months and was not able to elicit a single response. In two days, he uttered his first word and has begun vocalizing far better than I could have hoped for earlier."

"The method is exciting, and not as difficult to learn as I had previously expected. I enjoy the activities, but more importantly the children appear happy and eager also."

"You become aware early that the activities and routines are meaningful since there is immediate success on the part of the children in speech skills."

"I have noticed improvement in many areas of the children's functioning; socially and emotionally they appear to be developing more rapidly than I've experienced prior to working with Verbotonal."

"It's fun to teach now. All the youngsters are involved. Discipline problems are minimal. The children look forward to the activities."

House parents:

"The children are coming out of their shells. They are active, easy to approach and work with. Through all the activities of the day, outside the classrooms, they are friendly and outgoing."

"Many of the children would run and hide, or begin to cry whenever I approached them. All this has changed. They're nice to be with."

"I get a big kick out of the Verbotonal youngsters teaching the other children games and routines they've learned in the classrooms, especially at lunch times, when earlier these could be hectic."

Appendix H (Con't)

"It's not hard to guess who the leaders are among the children. I suppose because the Verbotonal children appeared to have matured more."

"I don't think we've had the problems with the very young children as we did previously. They seem to adapt much more readily to the routine. I think because they are happy with their new found skills."

Parents of the children:

"Every week end he comes home, I am so happy at the progress he made during the week."

"She is so proud of the words she has learned and the new words she picks up from the family. Her progress is unbelievable."

"The other children find him to be quite different than he was before; less fighting, crying and sheer unfriendliness. He enjoys his sisters and brothers more, and they him. They play a lot more together than they used to."

"My son is speaking in phrases and sentences and speaking clearly. Before it was a word now and then, and ones we could hardly decipher."

"It's nice to see him perform before the members of his family and so many relatives. They all agree the improvement is fantastic."

Visiting educators of the deaf:

"There is no question but that the methodology is certainly impressive."

"It is certainly atypical for a youngster of his age and involvement to be vocalizing as he is."

"The classrooms--teachers and children and activities--are something the likes of which I've never seen. A lot seems to be happening."

"I don't think I'll retire as I planned. I want to learn Verbotonal and work with the children again."

"It's an active method, characterized by total and complete involvement on the part of teachers and children. It can't miss."

"The atmosphere in the classroom is certainly conducive to the hard work necessary during auditory training. The teachers are friendly, knowledgeable and obviously sincere, They are very confident, too, which is a good sign as far as predicting success is concerned."

"Those routines used in language building exercises would be useful in all classrooms."

Appendix H (Con't)

"The American teachers appear to have gained considerable skills in Verbotonal in a comparatively short time. Perhaps they've been motivated by the successes they've experienced with the children."

"The children are vocalizing more than one would expect."

"Although they look very busy in that classroom, I don't detect any undue pressure on the children."