

The Verbotonal Aural Rehabilitation Program with Hearing Impaired Adults: A Five Year Summary Report

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A report of the verbotonal aural rehabilitation program used with hearing impaired adults at the New York League for the Hard of Hearing is presented. It provides a description of the auditory training equipment, as well as diagnostic, therapy and hearing aid fitting procedures. A summary is also included in the use of this method with rehabilitation patients seen at the League over a five year period. Results of this investigation suggest there is a positive relationship between the rehabilitation program and its effects in that 71% of the patients seen showed significant improvement in auditory perception following enrollment in the therapy program. This method appears to be helpful in that it identifies auditory functioning not usually diagnosed in standard audiometric procedures. As an aural rehabilitation method it is particularly beneficial to people who achieve good scores in discrimination tests but do not function well in day-to-day listening situations as well as those individuals who are not able to adjust to or accept amplification. In comparison to existing auditory training programs previously employed at the League, this method has proved to be more comprehensive in filling both diagnostic and therapeutic needs of the adult hearing impaired population.

Aural rehabilitation programs for adults often vary with the type of institution providing the services. In most cases, the overall goals are to help the hearing impaired individual adjust to his hearing loss and to provide him with the necessary tools to communicate and function effectively. If these goals are to be met, then an integral part of this rehabilitation process must be to examine how the individual is using his residual hearing

and determine if the use of this can be improved upon. This area of the rehabilitation program is usually referred to as auditory training or audio therapy. Since this is one part of aural rehabilitation with adults that has been given limited attention, procedures and rationale for auditory training vary widely between and even within rehabilitation settings.

In the majority of cases, existing auditory training programs which have been devised primarily for adults with acquired hearing losses are comprised of a series of listening exercises that are presented to patients seen individually or in groups. The techniques often do not address themselves to the diagnosis of the variables affecting auditory perception for each individual, and instructions can be vague as to when and how training should take place. During the past three decades many auditory training programs for adults have been evaluated and used at the New York League for the Hard of Hearing. Although some merit should be found in these programs, none seemed comprehensive enough to meet the full range of diagnostic and therapeutic needs of the hearing impaired.

In the summer of 1972, a project was initiated at the League to investigate and evaluate verbotonal aural rehabilitation with adults. This particular method was appealing because it provided for: 1) extensive diagnosis of the variables related to auditory perception; 2) remediation of auditory perceptual errors; 3) preparation of the patient for amplification and 4) selection of amplification according to demonstrated needs. Another attractive feature of the program was that the therapy techniques could be applied to both the unaided and aided hearing impaired individual. In addition, the program offered the possibility of systematically demonstrating the benefits of amplification to those who were resisting it.

The rehabilitation process begins when a patient is seen for a hearing evaluation or a hearing aid evaluation and exhibits one or more of the following problems: 1) poor speech discrimination in relation to their puretone audiogram; 2) an inability to achieve aided discrimination scores as good as those acquired under earphones; 3) good speech discrimination in quiet (*via* earphones or soundfield-aided or unaided) but poor perception in noise or at distances greater than three feet; and/or 4) an inability to adjust to or accept amplification. If any of these conditions are present, the client is then referred for an audio therapy evaluation. Here, his ability to perceive speech in sentences and single syllable words (PB and Tonality* tests) is tested under aided and unaided condi-

*The Tonality test is one which is based on verbotonal theory and is presently being standardized. Each test list consists of 25 words divided into five frequency groups: low, low-mid, mid, mid-high and high. A low frequency word might be "wood", a mid word might be "hat" and a high frequency word might be "cease". The test is used to indicate an individual's ability to perceive words of this type and assists in the overall diagnosis and therapy plan. It has

tions. Phonemic confusions as well as the effects of distance, speed of presentation, rhythm, length of sentences and noise are noted. During the evaluation an optimal frequency response (optimal field of hearing) is determined monaurally and binaurally on the SUVAG I and II auditory training units. These units are broad band amplifying systems (15Hz to 20,000Hz) that allow for the possibility of continuous and discontinuous transmission of speech. The SUVAG I has a flat frequency response as well as four low pass filters ranging from 600Hz to 3000Hz for which the roll-offs on both sides may be modified. Among the options on the SUVAG II are: a flat frequency response, six low pass filters ranging from 75Hz to 2000Hz, four high pass filters ranging from 3000Hz to 8000Hz, resonant peaks and additional treble and bass controls.

To arrive at an optimal field of hearing, the audiogram as well as the unaided Tonality results are used as a guide in selecting the initial frequency response. Tonality words are then readministered and the frequency response is modified based on observed errors. The frequency response at which the patient achieves maximum perception (as verified by Tonality and PB scores) with minimal decibel gain is the optimal setting. In addition to this frequency response under earphones the optimal also includes selection of placement on the body for the SUVAG-Vibar (an oscillator connected to the SUVAG I that assists in the transmission of the rhythm of speech). It should be noted that the optimal field of hearing is not static; it may be modified as the patient's perception changes during the course of therapy.

Next, the client is scheduled for individual therapy usually consisting of two one-hour sessions per week for one and one-half to three months. Here, all problem areas are worked on as the patient listens to isolated words and connected discourse (specially constructed sentences, newspaper and magazine articles, paired lists etc. that correspond to the patient's perceptual needs, language level and interests) presented at the optimal field of hearing. The patient is asked to repeat each phrase or sentence as it is read to him. If speech material is incorrectly perceived primarily because of phonemic confusion the clinician will attempt to correct this by changing parameters of her voice (pitch, intonation, intensity etc.), modifying the frequency response on the SUVAG, or presenting the misperceived word or sound in a variety of sentences or phonemic con-

been found for example that certain individuals having normal hearing or mild losses through 1000Hz with precipitous drops to severe and profound levels after 1500Hz, are able to perceive many high frequency words (very often at distances of 6 feet or greater), while other individuals with an identical audiogram cannot. When a high pass filter is supplied on the auditory training unit to the former client no significant improvement may be noted in his overall perception, while, in the case of the latter, improvement is observed. Therefore, the goal of therapy would be to train the first client to function without amplification while providing the second with an appropriate aid following therapy.

texts. If speech is misperceived due to speed of presentation, auditory memory, rhythm etc., then exercises are constructed to help remediate this. For each patient attempts are made to lower the gain on the unit, increase the distance from the sound source, and add noise, thereby training him to function in increasingly difficult listening situations. In every therapy session work is done both on the SUVAG unit and with the unaided ear.

The final stage of the program includes hearing aid fitting. Aids which generally correspond to the optimal field of hearing are selected and evaluated in therapy. (Fortunately, two hearing aid companies have designed a certain number of hearing aids based on input from verbotonal specialists. These aids have the possibility of providing frequency responses that are similar to settings often used on the SUVAG II, and are always included in the selection of aids for the patient.) The aid(s) with which the patient functions best is lent to him to use for the duration of the therapy program. In cases where the patient has already acquired a hearing aid prior to enrollment in therapy and the aid is not appropriate, steps may be taken to modify the frequency response of the aid. If this is not possible then the patient is lent a different aid that is more suited to his particular needs. The purpose of this procedure is to reinforce the patient's newly acquired skills with appropriate amplification outside the clinical setting and provide him with the opportunity to evaluate the hearing aid in various environments.

Towards the end of the therapy program the patient is scheduled for a standard hearing aid evaluation and the aid that has been found to be best in therapy is then compared to three or four others in conventional audiometric procedures. A final determination is made and the patient is seen for one or two follow-up sessions after purchasing the aid.

In the cases of those patients for whom amplification has not been found to be beneficial the therapy program is similar except the final goal is to train the individual to function optimally without a hearing aid. For these cases, emphasis is put on perception of speech *via* the oscillator alone which is placed on the head (usually the temporal bone) in addition to training done at the optimal field of hearing under earphones. Much of each therapy session involves training the unaided ear in increasingly difficult listening situation. At the end of therapy, the unaided patient with a mild hearing loss should be able to perceive conversational speech and single syllable words at distances of 15 feet or greater in a quiet environment.

The use of verbotonal rehabilitation at the League during the past five years has been encouraging. Results indicate that this method is more comprehensive and effective than any previously employed by our staff.

In order to verify this, several pilot studies have been done at the League attempting to compare selected aspects of verbotonal techniques to existing auditory training programs. However, since one of the facets of the verbotonal method is individualization of therapy techniques, it has been difficult to evaluate it in relationship to other programs by means of experimental and control groups. Therefore, the purpose of this paper is to provide a summary of the League's use of the verbotonal method from 1972-1977. The data presented has been drawn from the clinical records of patients seen during that time.

POPULATION

A total of 80 rehabilitation cases are included in this report. All but four were adults. The age range was from 10 to 81 years with a mean age of 48 years. The patients exhibited a wide range of hearing losses (mild through profound), speech reception thresholds and word recognition abilities. All patients except two demonstrated some ability to perceive speech prior to enrollment in the rehabilitation program. All hearing losses were sensorineural in nature and of varying etiologies; however, no patients were seen for therapy who had losses due to ototoxic drugs, meningitis or retrocochlear lesions. Eighteen subjects had losses which were congenital and the remainder were acquired. Nineteen subjects had no prior hearing aid experience.

For purposes of reporting results, the patients have been divided into three categories: category I consists of those patients who had poor discrimination (aided or unaided) in relation to their puretone audiogram; category II includes those patients who exhibited good discrimination under earphones or in soundfield (aided or unaided in quiet), but had difficulty functioning in many listening situations; and category III embodies those who had been unable to adjust to or accept amplification. In cases where a person exhibited more than one problem such as poor discrimination and an unwillingness to use a hearing aid, the individual was assigned to two categories. There are a total of 13 cases who were included in two categories.

TEST AND THERAPY PROCEDURES

All pre and post-therapy audiometric testing was carried out by six League audiologists in double walled, double room test chambers (IAC-Model 400 CTL), using Maico-24 audiometers. Speech stimuli, CID W-22 word lists, were presented *via* microphone monitored voice.

Audio therapy evaluations were administered by one clinician in a sound-treated therapy room measuring 15' x 17' x 16'. Speech stimuli were

presented via live voice at a conversational level of 50-60 dB.

Each patient was seen for individual therapy two-to-three times per week for an average length of time of three months. Therapy was carried out (according to the procedures described above) by nine League speech pathologists who had been trained in verbotonal therapy techniques. Each patient was assigned to a clinician who worked with him for the duration of the therapy program.

RESULTS

CATEGORY I: In this group there were a total of 53 cases whose hearing losses ranged from moderate through profound levels. Their discrimination scores were considered poor in relation to anticipated levels. Discrimination tests were administered to these patients prior to and following therapy under earphones and/or with hearing aids. Twenty-one patients were tested *via* earphones and hearing aids; eighteen were tested only under earphones and fourteen were tested only with hearing aids. Of the patients tested under earphones, four had testable hearing only in one ear.

As previously noted, this data had not been collected as a result of a scientific study and, therefore, tests of significant difference were not carried out to compare pre and post-therapy scores. Instead, taking into account the margin of error which exists for PB tests, it was felt that improvement in discrimination scores of 12% or greater would be considered significant and thus attributable to the rehabilitation program. The results of the post-therapy tests are presented in Figures 1 and 2. The abscissa represents the percentage of improvement in discrimination with scores ranging from .5% - 60.5%. The ordinant represents the number of subjects tested. In Figure 1 which shows results of the right and left ears under phones; 16 patients had improved discrimination scores of 12% or more for the right ear, while 19 patients demonstrated improvement of 12% or more for the left ear. For both cases 20 patients exhibited improved discrimination of 10% or less which was not considered significant. In Figure 2 which presents aided results, 17 patients demonstrated improved discrimination of 10% or less, while 18 patients showed improvement of 12% or more.

In examining significant discrimination improvement for this group in general it was observed that of the 21 patients tested under earphones and with hearing aids: four had improved discrimination under earphones alone (monaurally or binaurally); one had improved discrimination aided alone; and nine had improved discrimination under both conditions. For the 18 patients who were tested under earphones alone, 13 demonstrated improvement; and of the 14 patients who were tested via hearing aids

*Under
phones*

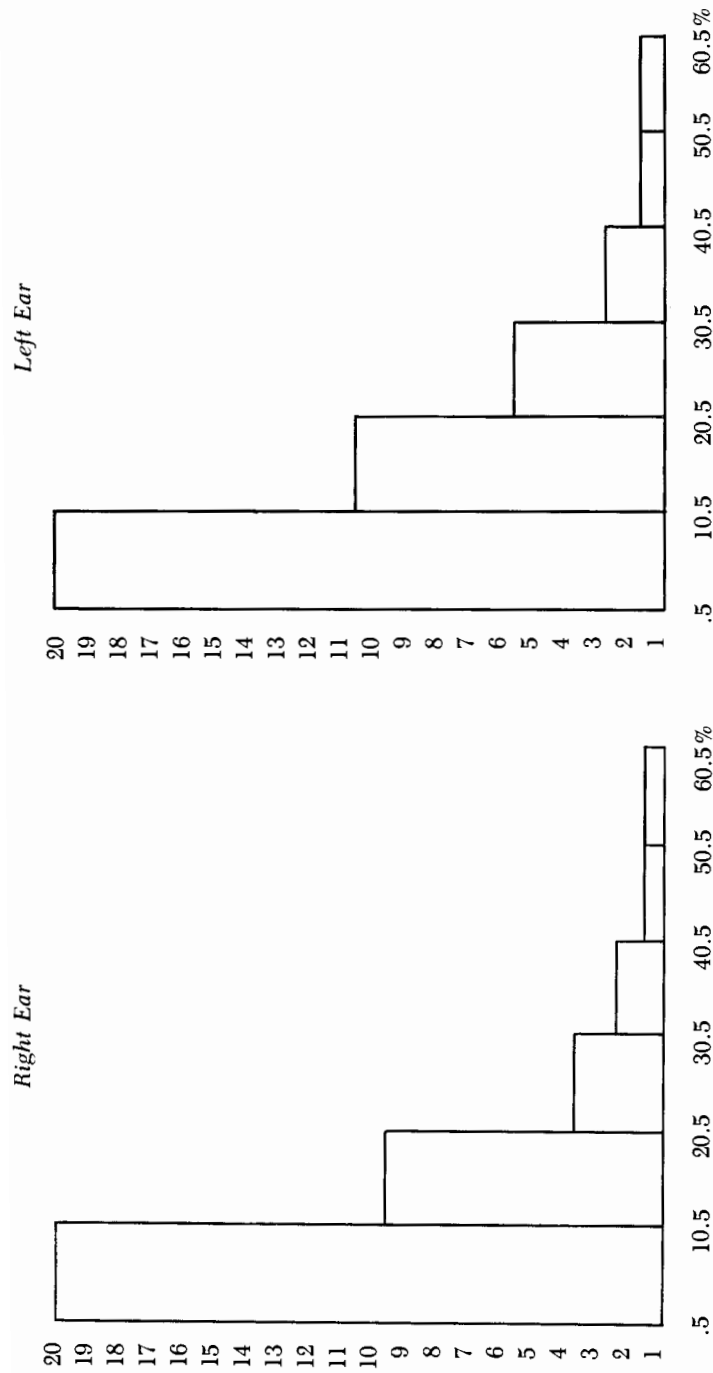
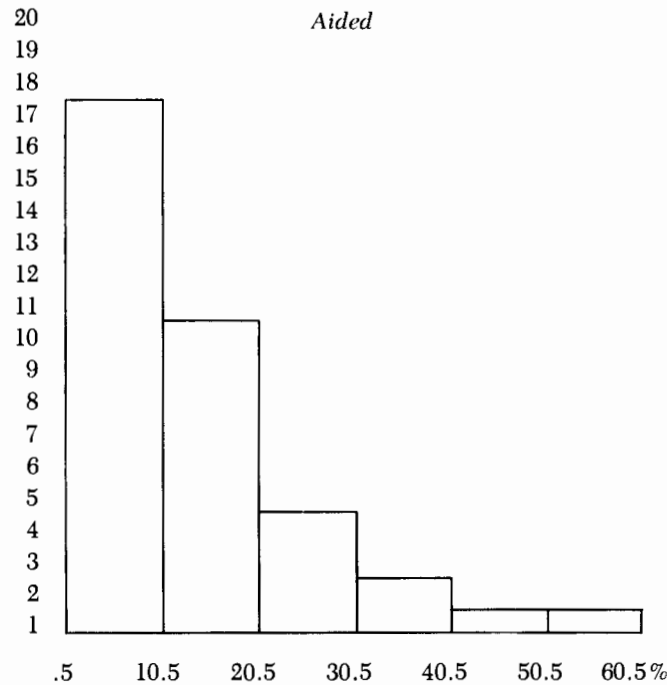


Figure 1. Percentage in improvement in Speech Discrimination under earphones.

Figure 2.
Percentage of improvement in Speech Discrimination with hearing aids.



alone, nine demonstrated improved discrimination. The total figure indicates that 36 cases of the 53 in this category had significantly improved discrimination skills following the therapy program.

Of the 35 aided patients, new aids were recommended as a result of therapy for 16 cases. Of these 16 subjects pre and post therapy discrimination scores both under earphones and with hearing aids were available for nine, of which in 7 cases, improvement was demonstrated under both conditions. This suggests that improved aided scores were not just a result of new amplification for these subjects. In addition, in the case of four patients who were seen for hearing aid evaluations prior to and following therapy it was observed that with the aid with which they functioned best prior to therapy, they demonstrated an improved discrimination score of 20% or better with the same aid following therapy.

It would appear then, that for 68% (36) of the 53 cases) of the patients included in this category, the goal of improved discrimination was realized. It is felt that this improvement is directly related to the therapy program.

CATEGORY II: Included in this group are 20 patients whose hearing losses ranged from mild to moderate-severe levels. Fourteen were using amplification at the time they were enrolled in therapy. All of these patients demonstrated excellent discrimination skills under earphones or in soundfield (aided or unaided) when tested in quiet in the audiometric test booths. However, they had difficulty functioning in listening situations either when background noise was present, when speech was presented at a rapid rate, or when they were not within three-to-six feet of the speaker. Of these 20 cases, two demonstrated rate and distance problems, one demonstrated rate, distance and noise problems, three demonstrated noise problems and 14 exhibited only distance problems. When these patients were seen for the therapy program a battery of audiometric tests had not been devised which could test for functional improvement in both the ability to process information presented at fast rates and to follow information presented at greater distances. Consequently, it was necessary to devise some functional criteria to measure improvement in auditory skills. Distance standards were established according to puretone averages for those patients who had difficulty in this area. All patients who were unaided and whose puretone averages were between 26-40dB were expected to receive a score of 90% or better on the Tonality test administered at a distance of 15 feet with the level of the speaker's voice being 55dB. Aided patients who had puretone averages of 41-55dB were also expected to achieve this same score at the above-mentioned distance. Patients having puretone averages of 56-70dB and who were aided were expected to obtain Tonality scores of 80% or better at a distance of 12-14 feet. In all cases, the patients were also expected to have no difficulty following conversational material or unfamiliar readings presented at these distances.

In cases where functioning in noise was a problem, discrimination tests completed in the audiometric test booth at a 0dB signal to noise ratio were used as a measure of improvement.

No tests were established to show functional improvement in a patient's ability to process information presented at normal and fast speaking rates. Subjective impressions of both the clinician and the patient were used to evaluate improvement in this area.

Of the 17 patients who demonstrated distance problems, 14 were able to achieve the distance criteria at the end of the therapy program. Of the four cases who had difficulty functioning in noise, three demonstrated a 20% improvement in discrimination when tested in noise following therapy. Of the three patients who had difficulty processing information presented at rapid rates, only short term improvement was observed. Without continuous reinforcement in this area, the improved skills did not hold. In the case of one patient the recommendation of a very wide

band frequency response aid seemed to alleviate the problem of following rapid-rate speech to some degree. It should be noted however, that all of these patients were over the age of 65 and their difficulty in this area may have been a result of a central processing problem. Although specific techniques were used in the program to improve an individual's ability to quickly process auditory information (a problem which often exists in the aged), minimal change was observed.

In reviewing this category as a whole, it can be stated that clinical goals were met and functional improvement in auditory skills could be documented both objectively and subjectively in 85% (17 out of 20 cases) of the patients included in this group.

CATEGORY III: In this category were 20 patients of whom 13 had also been listed in categories I and II. The patients' hearing losses ranged from mild-moderate through severe levels, and all of them had not been able to adjust to or accept amplification. Four cases had unsuccessfully tried hearing aids in the past and were not using aids at the time they enrolled in therapy, four had aids which they rarely used, and eleven refused to use amplification although it had been demonstrated to them that an aid would be beneficial. At the conclusion of the therapy program, 15 out of the 20 patients were using hearing aids successfully on a full-time basis. Two patients who had mild-moderate hearing losses used their aids in selected instances following therapy, and three patients remained unaided. Of these three, one refused to wear an aid because of cosmetic reasons. The other two had made earnest attempts to use amplification, but because of tolerance problems which could not be alleviated, they were unsuccessful.

The results of the rehabilitation program with the patients included in this category were felt to be of particular importance. Seventeen out of the 20 cases (85% of the group) made excellent adjustment to the use of a hearing aid. Without the involvement in this therapy program it is highly probable that the majority of the people listed in this category would have remained unaided and would have continued to experience difficulty in all forms of verbal communication.

SUMMARY

The preceding data was collected at the New York League for the Hard of Hearing and concerns 80 patients who were seen for verbotonal aural rehabilitation over a five-year period. The patients were divided into three categories according to their specific needs. For this population, rehabilitation goals were met and clinical as well as functional improvement was observed in 57 cases or 71% of the total population. Besides demonstrated test results indicating improvement, many patients

reported a real change in their ability to communicate which had a positive effect on their social interaction. On the other hand, 23 patients did not achieve success in this rehabilitation program, and the reasons for this must be investigated.

As a result of the League's use of verbotonal aural rehabilitation, several important questions have been raised. Among them are: What prognostic indicators can be developed to help determine who would benefit from this therapy program?; What could have been done differently to facilitate greater improvement?; Would another form of therapy produce the same or better results?; What kind of improvement can be expected in the area of processing rapid speech in the aged?; What battery of audiometric tests can be devised to measure functional changes in auditory perception?

Even with these questions in mind, it can be stated that the verbotonal aural rehabilitation program has filled a gap and provided the means to bring about optimum communication rehabilitation for a portion of the adult hearing impaired population whose needs previously had not been adequately met. It has accomplished this where other programs have failed. Certainly not every hearing impaired individual is in need of such an intensive aural rehabilitation program, but verbotonal does provide the possibility of help for those who are. Its very essence is geared to diagnosing and correcting auditory perceptual problems and filling demonstrated needs. This is what aural rehabilitation should be. For the staff at the League and for the patients who have benefitted from this program, verbotonal has proved to be not only a valuable clinical tool but also a program which can enrich the lives of many hearing impaired people.

REFERENCES

- ASP, C. "The effectiveness of low frequency amplification and filtered speech testing for preschool deaf children". Interim report, 1972 (Project 522113) available through ERIC Document Reproduction Service (Report No. ED 065-977) Bethesda, Md.
- ASP, C. The Verbotonal Method as an Alternative to Present Auditory Training Techniques. Chapter 10 in Wingo, J. (ed.) *Symposium on Communicative Disorders*, Springfield, Ill.: Charles C. Thomas, 1973.
- BERG, F. *Educational Audiology: Hearing and Speech Management*. New York and London: Grune and Stratton, 1976, 127-131, 264-265.
- BOULOGNE, J. *Manuel de Pedagogie: Reeducation de la perception des Sons du Langage au Moyen d'Auxiliaires Techniques—les Suvag*. Paris: Information et Publications, 1967.

- EISENBERG, D., SANTORE, F. The Verbotonal Method of Aural Rehabilitation: A Case Study *The Volta Review*. 78, 16-22, 1976.
- GUBERINA, P. Verbotonal Method: Its Application to the Rehabilitation of the Deaf. *Proceedings of the International Congress on Education of the Deaf*. Washington, D.C.: U.S. Government Printing Office, 1964.
- SANTORE, F. "Case Histories". *Audiology and Hearing Education* 4 28-32, 1978.
- VERTES, D. et al "Improvements in SRT and Discrimination Scores for Some Children and Adults as a Function of Verbotonal Therapy". Paper presented at the Tennessee Speech and Hearing Convention, May, 1972.