

**COMMUNICATION STRATEGIES - AN EVALUATION OF
ITS EFFECT ON COMMUNICATION OF
THE HEARING IMPAIRED**

Reg. No. M 9717

**An Independent Project submitted as part fulfilment of
First Year M.Sc, (SPEECH & HEARING) to the
University of Mysore.**

**ALL INDIA INSTITUTE OF SPEECH AND HEARING
MYSORE - 570 006
MAY 1998**

Dedicated to
Daddy and Mummy,
with all my love

CERTIFICATE

**This is to certify that this Independent Project entitled
*COMMUNICATION STRATEGIES - AN EVALUATION OF ITS
EFFECT ON COMMUNICATION OF THE HEARING IMPAIRED*
is the bonafide work in part fulfilment for the degree of Master of
Science (Speech and Hearing) of the student with Register No.M9717**

Mysore

May, 1998

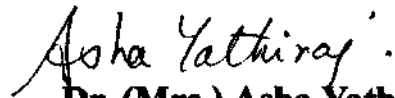

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This is to certify that the Independent Project titled "COMMUNICATION STRATEGIES - AN EVALUATION OF ITS EFFECT ON COMMUNICATION OF THE HEARING IMPAIRED" has been prepared under my supervision and guidance.

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DECLARATION

I hereby declare that this Independent Project titled **"COMMUNICATION STRATEGIES - AN EVALUATION OF ITS EFFECT ON COMMUNICATION OF THE HEARING IMPAIRED"** is the result of my own study under the guidance of Dr. (Mrs.) Asha Yathiraj, Reader, Department of Audiology, All India Institute of Speech and Hearing, Mysore, and has not been submitted earlier at any University for any other Diploma or Degree.

Mysore

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To my family, The reason for doing it all. **Dear Daddy**, for your love, inspiration and ever since I can remember, encouragement; **Dear Mama**, you will always be the most beautiful in my eyes. To both my **Ammachy's** and **papa**, I love you tons, always.

Dear Georgie,

*"There's a hero, if you look inside your heart you don't have
to be afraid of what you are.*

When you feel like hope is gone, look inside you and be strong,

And you will finally see the truth,

That the hero lies in you."

Dear Tarun,

"It must have been cold there in my shadow,

To never have sun light on your face.

You were contend to let me shine,

That's your way.

You have always walked a step behind.

I was the one with all the glory,

While you were the one with all the strain.

Beautiful face without a name,

Beautiful smile to hide the pain.

Did you know you are everything I would like to be.

I can fly higher than an eagle,

If you are the wind beneath my wings.

Dear Sangita.K

Wish you were here to see it happen!

You will always be on my mind and in my thoughts.

Dear Mili (Nonnnie) and Amritha (Daddy long legs) - You are been there for me when I needed you most. All the times we have been together, memories big and small will always have a special place in my heart now and always.

Dear Chamu, Gauri, Shameen and Anusha - You have been what they call "TRUE BUDDIES".

Whatever helps you to realise your dreams,

And preserve your beautiful memories...

Whatever you are wishing for with all your heart,

That's what you are wished for, now and always.

To all my **Classmates**, who have made me realise - "Thatswhat friends are for".

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Last but not the least, I thank the **Library** and **Staff** for all their help.

"Human Strength and human greatness,

Spring not from life's sunny side.

Heroes must be more than drift wood,

Floating on a waveless tide ".

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INTRODUCTION

Human communication involves a rich tapestry of information conveyed through elements of movement, emotional expression and vocalisations. Spoken language is one form of communication that enables humans to convey information with specificity and detail. The majority of individuals develop language and communication skills that are used over a lifetime with little apparent effort. In most cases the occasional miscommunication or misinterpretation is easily corrected for some individuals, however, communication breaks down because of a hearing loss. Normal communication includes both verbal and non-verbal aspects. Communication can occur without language and in certain situations, language does not always communicate as well as it could. Normal communication requires various normal biological systems. Break down in any one of these systems will prevent the normal acquisition of speech and language or cause these skills to be lost after they are acquired (Boone, 1993).

Communication is successful when information is accurately transmitted from a sender to a receiver. Some aspects of communication such as non-verbal elements are not always intentional. Posture, facial expression and voice quality may combine to indicate fatigue even when an individual is very interested in the topic of conversation. Other elements such as speaker's status, speaker's proximity and gestures are used to communicate. The speaker's status, attitudes and emotions (Boone, 1993).

In almost every human society primitive or complex the primary mode of communication is by speaking or hearing (Berger, 1978). When human beings communicate, it is for the purpose of sharing thoughts, feelings, ideas and emotions. Communication is thus social and interactive, requiring participants to act at times as both sender and receiver of information. Effective communication occurs when individuals accept their shared responsibility to provide feedback on how the content of the message was received either verbally or non verbally and when the responses are made that are appropriate to the person, setting, topic and task of communication, the interaction of all these components contribute to successful exchange of information between people and thus basic communication process becomes more difficult when one of the participants has a hearing loss.

When a hearing deficit develops after language rules have been learned thoroughly the individual is not faced with a complete break down in auditory communication. The process being primarily cognitive, linguistic in nature, has so much redundancy that a surprising amount of information lost in the acoustic signal can be compensated for before communication break down occur. (Trychin and Boone 1987).

When the sense of hearing is impaired the ability to relate may be impaired as well. Messages may not be interpreted properly because crucial words are missed and the hearing impaired person does not catch the nuances of the meaning conveyed by a rising inflection, a pause or an emphasis in a particular part of an utterance (Verderber and Verderber, 1986). Normal hearing is often taken for granted and a hearing impaired individual is the only one who can understand the extent of learning to cope and adjust according to the needs of the society. These people experience

difficulty and frustration beyond that experienced by normal hearing counterparts. If the hearing impaired persons hearing deficit is severe enough to prevent adequate monitoring of his/her own speech production, then the production and transmission of correct speech sound patterns will also be effected. This compound the interpersonal communication problem (Mc Ginnis - 1993).

Thus it is the aim of habilitation/rehabilitation procedures to develop compensatory communication strategies to reduce the impedance between the individual and the larger communication matrix into which that person must fit (Palmer, 1988).

Many important information are often missed or misinterpreted by these hearing impaired adults and much time is lost trying to understand or correct the misperceived message leading to a communication break down. Communication strategies help overcome these break downs in communication in the perception of the spoken message. Thus highlighting its importance and usage in appropriate context.

AIM:

This study aims at evaluating the improvement in communication in the hearing impaired subjects after they were trained to use communication strategies. It also aims at comparing the performance of the hearing impaired before and after training, with performance of normal hearing subjects.

NEED FOR THE STUDY:

Review of literature on the communication strategies by Manoj. (1997) compiled various strategies that are currently in use by the hearing impaired. However, no data was available on the Indian hearing impaired population regarding the efficacy of these strategies. Thus an evaluation was necessary to compare the performance before and after they were trained to use these strategies in communication.

REVIEW OF LITERATURE

COMMUNICATION OF THE HEARING-IMPAIRED

Communication skills are necessary to interact effectively and appropriately with the world around us (Wood, 1976). Language has been referred to as a "tool" for communication. Actually, language can be defined in many ways, depending on how one perceives the making of the word. We do know that language is extremely important as it is the foundation upon which other skills, such as speech, reading and writing, are built. We also know that, in reality language is not a separate entity that can be learned without consideration of other aspects of the individual.

Our personality, interests, maturational level, and amount of exposure to the world about us all lend to the development of language and are reflected by the manner in which we use it (Wood, 1976).

LANGUAGE AS A MEANS OF COMMUNICATION

The term language is frequently conceived as "what someone has said" or as "spoken words". Although words are a major avenue for interacting within our environment, language involves more than the mere use of words. Receptive language includes how we perceive and interpret the thoughts, ideas, emotions, and feelings of others and, in general, the world around us. Expressive language, on the other hand, refers to how we convey, or communicate these same aspects to others (Bloom and

Lahey, 1978 and Sitnik, 1978; Wood, 1976). These two entities receptive and expressive, are also inter-related in the general development of language. In other words, the quantity and quality of input (reception) will have a direct effect on the output (expression).

VERBAL AND NONVERBAL CHANNELS OF COMMUNICATION

The use of both receptive and expressive language involves verbal and nonverbal channels of communication.

Verbal communication does include the use of words for labeling and/or describing objects, thoughts and feelings. However, the grouping of these words into phrases and sentences (syntactical units) aids in understanding and interpreting the meaning of the message. The use of additional words and the order in which they are presented reduce the options of the intended meaning for which a single word may present to the listener. The second general category, nonverbal communication, involves the characteristics of the speaker's voice and the use of body language. The voice characteristics (often referred to as the suprasegmental or prosodic features of speech) include the pitch, intensity, duration and intonational or inflectional patterns used by the speaker. Body language include eye contact, facial expressions, body movements, gestures and the distance the speaker maintains between himself and the listener (Webster, 1977; Wood, 1976). We consciously or unconsciously interpret a speaker's meaning, therefore, by analysing a combination of various verbal and nonverbal aspects of the message.

The inter-relatedness of the verbal and nonverbal aspects of communication :
 The very young child frequently employs single words such as "doggie", to communicate his or her thoughts. However, the person receiving the message needs additional information for accurate decoding of the intended message. Is the child simply naming the animal or checking his vocabulary accuracy? Is the child trying to convey a specific message related to the dog or does he or she simply want us to look at the discovery? The use of a syntactical structure, such as "bad doggie" provides information that the child may or may not feel that the dog has done something wrong. The child may still be asking a question rather than passing judgement. Now the suprasegmentals of speech aid in clarifying the words as a statement rather than a question. For example, the child's pitch may be lowered in a scolding manner, a downward inflection on the word "doggie" distinguishes it as a declarative statement, and the loudness or intensity of the child's voice may indicate not only anger, but the degree of this emotion. The child's body language, including an angry face, clenched fists, and the forward movement with a mighty blow to the dog, also illustrates the child's anger and the intention for the animal to stop whatever he is doing.

CONGRUENT AND INCONGRUENT MESSAGE

So far in our discussion of the verbal and nonverbal aspects of communication, we have assumed these were congruent messages. Congruency means that the various verbal and nonverbal aspects are in agreement with the intended message. Incongruent messages occur when there is a conflict between one or more of the various communication channels. Wood (1976) discussed the fact that sarcastic remarks and

joking, present problems to a 12 year old hearing child, and even to some high school students, due to the complexity of sorting such a message. Just as the hearing juvenile may have difficulty understanding the incongruent message of an adult's sarcastic remark due to inexperience in decoding such messages, it is in this same manner that the hearing-impaired child has problems in interpreting simple congruent statements. Due to lack of exposure to the world about them, to the language employed by their hearing peers, and because of the auditory deprivation, the deaf frequently never acquire the ability to decode messages that carry new or extended meanings, or that differ from the literal.

There are various channels of communication that depend heavily on both the auditory and visual senses. We not only hear the words, their ordering, and the voice of the speaker, but we can also observe the speaker's reaction. In addition to understanding the content and form of our language, the development of perceptual and cognitive skills related to our interactions with others and the world about us are necessary to develop appropriate and effective communication skills. Due to auditory deficiency and the fact that many important cognitive and perceptual skills are learned during the first few years of life, early identification and intervention for the young hearing-impaired child is extremely important for language development so that he or she will not be deprived of these necessary skills.

LANGUAGE OF THE DEAF

There have been numerous investigations, utilizing a variety of methodologies, into the language abilities of the hearing-impaired. These investigations have attempted to define specifically the language of the deaf to determine how their abilities deviate developmentally from those of hearing adults and the reasons why such deviations exist.

These investigations have also been conducted in an effort to assist educators in enhancing the hearing-impaired future language abilities.

What are the results of those investigations and what do we really know about the language of the deaf? Ivimey (1982) reviews the investigations of several people, including those of Blanton (1967, 1971), Brannon (1968), Cohen (1965), Heider and Heider (1940), Moores (1970), Myklebust, (1964), Simmons (1962) and Wells (1942).

In his article Ivimey (1982) points out the various shortcomings that exist in previous investigations of deaf language, but he finishes the discussion with some general information that he believes reliable. He concludes that hearing-impaired adults produce less language regardless of the methods employed to measure the deaf's abilities. Ivimey (1982) believes that hearing-impaired adults show a preference for short simple sentences rather than long complex or compound sentences. There is an overuse of nouns and verbs by the deaf and an under use, or misuse, of auxiliaries, prepositions, determiners, and adverbs.

Negative and interrogative sentences were reported as frequently incorrect, structurally. Each sentence employed by the deaf tends to form an isolated conceptual unit, and successive sentences rarely carry a single thought or group of thoughts.

Improving Communication Skills - Various Alternative Communication Strategies :

AURAL REHABILITATION

Specific approaches, alone or combined, rarely fit the needs of all hearing impaired clients. It is best then, for audiologists to develop a philosophy regarding aural rehabilitation and then, taking that philosophy, extract, remold and design programs that fit individual clients communicative needs.

What then, is aural rehabilitation? A wholistic philosophy that would serve audiologists well was written by Braceland (1963). He states that rehabilitation, in its broadest sense, encompasses a philosophy that a handicapped person has the right to be helped to become a complete person, and not only to be restored as much as possible to usefulness and dignity, but also to be aided in reaching his or her own highest potential. This is a far reaching philosophy that should guide all persons who work in helping professions. In aural rehabilitation, however, such a philosophy should guide the audiologists to serve the needs of individual clients. Thus, not every hearing

impaired adult should be placed in aural rehabilitation treatment groups, nor do all require extensive hearing orientation, nor do all require special amplification devices.

Such a philosophy suggests that, for some, the process of aural rehabilitation may involve a session or two to resolve a specific problem the client is experiencing within a specific communicative environment, and perhaps several more brief contacts to assess progress. Another may only require a hearing aid orientation program with a few follow up visits for adjustments of the hearing aid and suggestions for more efficient use of the aid in difficult listening environment. Others, however, will require more lengthy and comprehensive aural rehabilitation programs.

In any event, there are guidelines that will aid in the planning and execution of efficient aural rehabilitation programs for adult clients. The following are some principles that seem important both to rehabilitative procedures and to the rehabilitation program; Auditory and visual stimuli should be presented to the client with maximum clarity during initial sessions. The client should experience a maximum degree of success in the initial phase of the therapy process. Not only will this success motivate him or her to continue to attempt speechreading or to make the auditory discriminations necessary to comprehend, but the client will begin to develop a pattern for approaching more difficult listening situations. By this procedure he or she will initiate informal data collection and preparation for the more difficult listening situations to come later in therapy or in day-to-day living.

Auditory and visual stimuli initially should be presented with sufficient redundancy of cues that the client experiences both successful performance and acquisition of knowledge regarding the receptive communication task. In the normal

reception of communication, redundancy constantly reinforces our "best guess" regarding the probable message.

The positive feedback about our first best guess gives us the courage to make the next guess. Each cue adds data to help us make a decision and reduce our fear of the next dubious situation.

The clinician should serve as a model of a person who functions as an effective communicator. Clear, articulate speech without unnatural over articulating, which tends to confuse persons attempting speechreading, should be the norm. Appropriate intensity levels of speech for maximum intelligibility in varying listening situations should be sought. Unintentional masking of visible speech by hands or head movements should be noted and avoided.

Therapy and practice material, both auditory and visual, should be selected for general and specific applications, i.e., for those situations common to most communicators and for those circumstances unique to the individual client. The unique communication needs of the client must be addressed in the therapy session. Varying occupations, social, and environmental conditions requires the audiologists to prepare his or her client for realistic communication. Practice sessions should be undertaken with the problems of real life situations in mind.

Clients should not only be informed of the clinician's general and specific objectives, but should also formulate their own goals, some of which should be co-managed with the clinician's while the remainder are the client's responsibility. Since auditory rehabilitation is a learning process, the client must be made aware of his

or her part and responsibility. To often, audiologists have applied the medical model of treating the symptom. In a learning, or more appropriately a learning process, the therapist is only part of the process and the client's degree of active involvement is of paramount importance. Carry over to real life situations cannot and will not be fully accomplished unless the client is totally aware of personal responsibility.

Clinicians should establish an explicit catalogue of possible methodologies to achieve specific objectives and then review this information during planning of individual therapy. Varying approaches to therapy should be learnt from the literature. Novel approaches developed by colleagues or individual clinics should be attempted and evaluated for future use.

Both individual and group therapy programs should be available to clients. Communication is a dynamic process that must be developed with varying speakers and in varying situations. The client-therapist model is only one approach and should not be the only one considered. Group sessions should be structured to permit not only a "dry run" for the objectives of an individualized lesson, but also for practice with different speakers. The group situation also permits the client to discuss with peers the communication problems to each member.

Clients should be instructed regarding alternative listening strategies appropriate for specific communication situations. The clinician should explain to the client why certain situations are more difficult than others to communicate. The client explains that the aid set at the prescribed level help in a one-to-one situation, but in groups he or she may not understand the conversation clearly. Here the client should be informed that this is to be expected in certain noise situations and that an

alternative listening approach may be to turn down the aid and rely more on speechreading. This approach should be encouraged in a few similar situations to help determine if it is a viable alternative. Other difficult situations should be discussed for the purpose of developing alternative strategies. These will add to the client's confidence in knowing that there are many ways of attempting to overcome difficult communicative environments.

Clients should be instructed regarding alternative response criteria appropriate for specific communication events. Many clients seem to adopt avoidance and/or withdrawal behaviours during situations requiring their participation in the communication act. Responses may include a range of behaviours from total noninvolvement in specific communication situation to the other extreme, attempting to dominate the conversation. Therapy planning might include activities that directly involve principles of effective interpersonal communication.

Systematic practice during and outside therapy sessions should be given high priority by both the clinician and the client; at the same time, spontaneous practice opportunities should not be ignored by either party. A balance needs to be maintained between systematic and nonsystematic therapy activities. The two extremes are to be avoided, that is, boring and repetitive drills versus completely open-ended and nonstructured sessions. Each clinician needs to calibrate the therapy approaches so that some activities on the continuum between these extremes are included, but with neither end dominating the general or specific aspects of the program.

Since successful communication is exciting and satisfying, therapy activities also should contain sufficient opportunities for similar positive interactions

and experiences. Therapy does not have to be static in all aspects. Interesting but still challenging training activities can be planned. Establishing a relaxed and satisfying communication relationship with clients is an ingredient of successful interaction that appears to be discussed in frequently. Developing and maintaining motivation are important potential effects of a relationship where in humor, active involvement, and dynamic interaction are part of the therapy program and not the exception.

Any opportunities for improving the speech expressiveness of the client's family, friends, and other should be exploited. Too often, it seems, clinicians concentrate exclusively upon the client, with little or no attention given to significant others who are important to the client. Interviews and discussions with family and friends might be of substantial importance to the client. General improvement in the communication expressiveness and effectiveness of these individuals could reduce the client's difficulties as much as, if not more than, therapy activities directed only to the client.

Development of assertive influence on the communication environment by the client should be an essential component of therapy. Assertiveness, without aggression, can be an important therapy objective. The client can learn to stage-manage situations and communication events to maximize the probability of successful communication. Reducing background noise levels, decreasing the distance from a talker, optimizing lighting for speechreading cues, and requesting that the talker use clearer speech and appropriate gestures are examples of areas where the client can become assertive and active in improving the communicative circumstances.

Clients should be encouraged to establish and maintain a balance between dominance and submissiveness during communication event. The client may need counseling directed at emphasizing and demonstrating the give and take of many communication situations. Again, a balance between dominating and withdrawing behaviours might be explored during therapy. Acceptance of realistic expectations also could be addressed. Few of us can claim successful communication with even the majority of persons with whom we come in contact. In short, the client may be assuming too much personal responsibility for communication events.

Counseling activity should be considered essential to the effectiveness of other components of the therapy relationship. Counseling skills seem essential to the success of any therapy relationship. Audiologists are becoming more and more aware of this, and some training institutions are including formal courses and practicums in counselling as part of the curriculum. Counseling may be one of the most important activities involved in auditory rehabilitation. If this is true, then major attention and effort will need to be directed toward developing counselling skills in graduate students and in practicing audiologists.

Developing technology should be incorporated into therapy activity on an experimental basis, and resulting judgements of specific equipment for specific purposes should be shared with other practitioners. Technological aids, in addition to hearing aids, should be applied through the aural rehabilitation program. These include, as examples, telephone amplifiers, teletypewriter, prerecorded practice materials for home use, video cassette auditory visual training systems, and radio

transmission devices for specific social or vocational situations. Such existing technology can be used to enhance communication for clients with special needs.

IMPROVING COMMUNICATION SKILLS

Upto this time, the discussion in this chapter has centered on some early traditional methods used in attempts at improving hearing impaired persons ability to communicate in their worlds and the benefits and limitations of the sensory modalities used in the verbal communication and in most forms of aural rehabilitation.

As noted earlier, the approaches to aural rehabilitation for adults that appear to be most effective are those that are wholistic. That is to say, there is more to resolving the communication deficit resulting from an adventitious hearing loss than learning to use residual hearing and complementary visual clues. However, this does not mean that these aspects are an important in the rehabilitation process. The most critical aspect of then process of aural rehabilitation is the client. This is where some of the earlier approaches may have lost their validity. Current philosophies which stress wholistic approaches to aural rehabilitation services for the adult include those by Fleming, Birkle, Kolman, Miltenberger and Israel (1973), Binnie (1976), Colton (1977), Tannahill and Smoski (1978), Alpiner (1978), and many others. Fleming et al. (1973) for eg. noted that although approaches to aural rehabilitation treatment may vary from therapist to therapist, this type of variation is good only if it still meets the specific needs of a client. Tannahill and Smoski (1978) stressed that regardless of the age of the client or the degree of loss, each individual must be considered in light of his or her background, current needs, and life-style, and the anticipated demands on his or her communication skills.

It appears that audiologists are currently adhering to philosophies that address aural rehabilitation as a many-faceted process, that goes beyond speechreading and auditory training. Again however, the latter aspects are usually part of the process.

APPROACHES TO AURAL REHABILITATION TREATMENT

More traditional, but contemporary, approaches include those of O'Neill and Oyer (1961). In their discussion of visual training, they refer to a number of avenues to train the hearing impaired individual to use vision more fully as a means of communication.

O'Neill and Oyer (1961) suggested that the visual form training accomplished two purposes for the lipreading client. Those are, first the development of visual concentration, and second, the development of synthetic ability. They also suggested an approach to training clients in the combined use of visual and auditory clues. The initial stages of aural rehabilitation training could be without voice so that the hard of hearing person could focus his attention upon the visual aspects of speech. If such an approach is not employed from the beginning, the auditory channel would be used exclusively and the subject would not try to make use of the visual cues. Only because of this initial 'sensory' isolation would the individual be alerted to the use of lipreading alone.

Even though their rationale for the visual only training has merit in some instances for some clients, many audiologists today are avoiding unisensory approaches, particularly with adult clients.

The O'Neill and Oyer approach to the combined use of vision and audition includes beginning with combined practice in environmental noise conditions - in other words, not in an ideal communication environment. They recommend beginning at a 0 dB signal to noise ratio. The program suggested by them is as follows :

1. Progress from words utilizing lip sounds towards words with open articulation (vowel) sounds.
2. Auditory discrimination of isolated sounds.
3. Amplified sound, introduced first at threshold, and then gradually increased to make a smooth transfer from vision to combined vision with audition.
4. Association of gestures and facial expression with quality and rate of speech.
5. Use of phrases, sentences and stories.
6. Story retention (thought level rather than words or sentences), assessed by multiple choice tests.

Another approach has been presented by Sanders (1971) who states, "As one might expect, formal lipreading lessons are highly structured..." The lesson is divided into separate units, each of which concentrates upon a particular aspect of

visual communication". Even though Sanders advocated approaches to aural rehabilitation that utilize audition, vision and the special communicative needs of the client, he cited improving communication.

Nitchie's (1950) approach has several stages which are as follows :

Stage one - Increasing awareness of articulatory movements

Stage two - Recognition of articulatory movements

Stage three - Practice words related to articulatory movements studied in stage two.

Stage four - Sentences utilizing the practice words from stage three. Alternatives in sentences include 20 cards, on each of which is written an answer to questions.

The instructor presents the questions, and the client selects the card that contains the appropriate answer, or vice versa for variety's sake. True-or-false questions on various topics and connected discourse using anecdotes, dialogue, or stories on various interesting topics are also advocated.

Sanders (1971) stresses that even though formal approaches to lipreading can be utilized for both adults and children, they "should not distract the teacher from grasping every opportunity to meet the (special) needs ... both of individual students and of the group".

Costello (1974) also presented an approach that was traditional in nature, but involved more than a formal approach to the use of visual and auditory clues in communication. It emphasised current methodologies in aural rehabilitation, and involved the following components.

1. Evaluation of peripheral and central auditory disorders
2. Development or remediation of communication skills through specific training methods
3. use of electronic device to increase sensory input (auditory, vibratory and others)
4. Counselling regarding the auditory deficit
5. Periodic reevaluation of auditory function
6. Assessment of the effectiveness of the procedures used in habilitation.

CURRENT APPROACHES

McCarthy and Alpiner (1978) suggest a "progressive approach" to aural rehabilitation treatment that is based on modifying either the clients behaviour and attitudes or the clients environment or a combination of both. In modifying the clients behaviour and attitudes, the emphasis is on developing the willingness to:

1. Admit the existence of the hearing loss and its handicapping effects,

2. Admit the hearing loss to others and
3. Take positive action to minimize communication difficulties by asking others to repeat and speak more clearly, and asking for selective seating.

According to these authors, the sequence of their approach is as follows :

1. Audiologic and hearing aid evaluation,
2. Assessment of communication function,
3. Identification of problem areas due to a hearing loss,
4. Verbal discussion within the group regarding problems,
5. Admission of hearing loss to themselves and to others,
6. Modification of behaviour, attitudes and environment,
7. Willingness to utilize amplification in nonthreatening therapy sessions,
8. Reduction of stress in communication situation,
9. Willingness to utilize amplification outside of therapy sessions,
10. More effective communication with normal hearing persons and
11. Termination of therapy.

This approach concentrated on the psychological impact of hearing impairment, and the clients response to the deficits experienced in his or her environment. This philosophy seems appropriate for portions of an aural rehabilitation treatment program, and addresses important areas to be covered. It is stressed, however that not all audiologists are trained as counselors, and they should not venture into areas where problems (emotional or otherwise) require counseling by professionals trained to do so.

Various authors presented a wholistic approach to aural rehabilitation treatment. It involves counseling, hearing aid orientation, designing a program (for increased communicative efficiency that is based on individual clients prioritized needs), specific treatment procedures, and evaluation of successes (or lack of them).

This approach lends itself to both younger and older adult clients. Its premises are that, first, each client has special priority needs that revolve around his or her frequented communicative environment; second, most clients can benefit from specific treatment techniques that are based on language factors that, if brought to a greater level of awareness, aid in communication; and third, the majority of hearing impaired adults complain of difficulty communicating in noisy or otherwise distracting environments. Practice in learning to cope in those environments can be of common benefit to most clients.

The last two decades have been increased emphasis on rehabilitation programs to assist adults to cope with their hearing disability.

Today's programs take a broad perspective and focus on the overall handicapping effect of hearing difficulty. Most importantly, these programs centre on communication and manner in which communication process is disrupted.

Good verbal communication skills facilitate emotional, educational and social growth. Effective communication is the greatest problem two people face in interacting with each other (Shostrom, 1967). People spend a great deal of their life trying to make others understand what they are trying to say or trying to understand what is being said, to them (Fleming, 1972). It follows therefore, that if any aural rehabilitative program is to be effective it must be designed to meet the wide range of needs of the target population primarily focussing on verbal communication.

However, it should also centre on ways in which a breakdown in the communication process impacts on other everyday activities, such as performance in the work setting, interpersonal relationship with friends and family and personal business transaction.

COMPONENTS OF AN AURAL REHABILITATION PROGRAM

The first step of the aural rehabilitation process consists of a thorough evaluation of hearing impairment and its handicapping effects.

This evaluation process will have identified the organic status of the auditory system mechanism and a number of potential communication difficulties which are generally associated with :

- A. The audibility of the message.
- B. Speech discrimination.
- C. The environment including background noise and communication situation, and
- D. Response to auditory failure.

Thus a specific management program is outlined which will consist of personal amplification through the use of a personal hearing aid(s). The aural rehabilitation program is designed to help the person make optimal use of auditory cues.

OPTIMAL USE OF AUDITORY CUES

For persons with normal hearing, the auditory modality has played the primary role in most of their mental development. The hearing impaired person should be advised that speech predictability assists persons who have acquired a hearing impairment to compensate effectively, even though many auditory cues are diminished as a result of the disorder. With the help of amplification many of the physiologic and acoustic cues are restored. Because the major parameter of hearing impairment is reduced sensitivity as a function of frequency, the basic foundation of the remediation process is amplification. That is, the more intense the speech signal. The more content cues that become available to the listener.

HEARING AID ORIENTATION

A carefully orchestrated hearing aid orientation program is usually sufficient to start the post-lingually hearing-impaired person on the road to making optimal use of residual hearing through the use of amplification.

Some authors suggest that extensive auditory training can be helpful in improving speech perception (McCarthy and Alpin, 1982) which can be defined in terms of 3 parameters:

1. Learning to recognize auditorily those sounds which have been incorrectly discriminated.
2. Pre and post hearing aid orientation including adjustment to amplification
3. Improvement of tolerance level.

COMMUNICATION STRATEGIES

Strategies may be divided into two categories, anticipatory and repair. Anticipatory strategies involve predicting possible problems in a situation and finding a way to handle them. They may be thought of as presituational modifications.

Repair strategies on the other hand, involve things that can be done when actually facing a difficult situation.

ANTICIPATORY STRATEGIES

A person with hearing impairment may feel more comfortable during an interaction because he or she has anticipated it, even though speechreading may not be facilitated. In addition, simply having a definitive course of action to pursue may cause person to feel more positive about a hearing loss. Whether such psychological benefits exist and whether they are great enough to warrant workbook and partner-practice activity await further study. However, Tye-Murray, Purdy, and Wood Worth (1992) presented data that suggest that psychological benefits are small. Tye-Murray et al. (1992) surveyed 212 members of the Self-Help for Hard of Hearing People organization.

Respondents indicated how likely they were to anticipate vocabulary and statements whether they believed people with hearing impairment appear less intelligent than normal hearing people and how likely they were to engage in a number of social interactions. Respondents who thought that poor speechreaders appear less intelligent and those who usually avoid social interactions were also those who said they would be most likely to use anticipatory strategies.

All the subjects had undergone training but may not have benefitted from training because they were already familiar with the content of an interaction at a doctor's office, bank, gas station, and movie theater. Had they been asked during the initial test session to speechread (lipread) an unfamiliar person speaking about an unfamiliar topic or using unfamiliar vocabulary, and then received training that included the new vocabulary and information about the topic, they likely would have

demonstrated better speech recognition during the second test session as compared to control subjects.

Henry Kisor, a Chicago Sun Times literary critic who has profound hearing impairment, described how he prepared for an interview (Kisor, 1990): Before meeting an author, he researched the author's writings, read other interviews with the author, and familiarized himself with the author's public statements. He believed that this type of anticipatory strategy helped him communicate more effectively because he had some idea of what the author would say. Perhaps this kind of preparatory work, focusing on the possible content of the interaction, was more effective than preparatory work that focused on the form of the information, such as speechreading potential vocabulary and sentences.

Instead of asking clients to review vocabulary and statements that might occur during a communication interaction, aural rehabilitation specialist might ask the client to participate conversational content (Tye-Murray, 1992).

The most effective anticipatory strategies recommended by Horn, Mahshie and Wilson (1983) includes -

- Anticipating environmental problems
- Anticipating possible vocabulary
- Anticipating possible dialogue and its sequence
- Anticipate questions that might be asked.

- Decide upon information to be obtained.
- Plan questions to be asked
- Decide on how to narrow the questions
- Consider to be assertive.

These anticipatory strategies mentioned, on using effectively and efficiently helps overcome communication breakdown. These strategies require planning well in advance on the part of the hearing impaired. Thus it is recommended that people with hearing impairment should be prepared for the communication interaction by anticipating the possible difficulties faced during a communication breakdown.

Manoj (1997) in his Independent project reviewed the various anticipatory and repair strategies from literature and arranged them in a hierarchical order with the most important and widely used strategies reported first and ending with the least important ones. He took the help of professionals involved in the rehabilitation of the hearing impaired adults who were asked to arrange the strategies in order of importance based on their experience. The anticipatory strategies listed were -

1. Adequate lighting
2. Avoid noisy situations
3. Anticipate vocabulary/conversation
4. More closer to the speaker.

REPAIR STRATEGIES

A breakdown in communication occurs when an oral message intended for a hearing-impaired individual fails to be understood. Several strategies can be used to restore the verbal exchange. Some strategies may be initiated by the person receiving the information while other strategies may be instigated by the individual students failed to understand a spoken message. They were (1) REPETITION of all or part of the utterance; (2) applying oral/facial EMPHASIS to all or part of the utterance; (3) manipulating vocabulary of syntax to affect a STRUCTURAL CHANGE and (4) providing SUPPLEMENTARY INFORMATION in the form of additional cues, sending the message (Kalpan, Bally, and Garretson, 1987; Owens and Telleen, 1981). Erber and Greer (1973) observed the repair strategies used by classroom teachers at an oral school for hearing-impaired children. They identified four basic response patterns used by teachers when hearing-impaired

Other repair strategies have also been identified. They include : provision of keywords; spelling a misperceived segment; presenting individual digits to convey long numbers; writing, signing, or finger spelling misperceived words request for clarification or conformation (Erber, 1985; Kaplan et al. 1987; Owens and Telleen, 1981).

The use of repair strategies occurs naturally in everyday conversations. In addition, some programs designed to enhance the speech-reception abilities of hearing-impaired individuals have incorporated specific repair strategies in their

training paradigm. For example, the repetition of stimuli incorrectly identified has been used in training programs designed to improve the speechreading skills of hearing-impaired subjects (Lesner, Sandridge and Kricos, 1987; Montgomery, Waden, Schwartz, and Prosek, 1984; Walden, Prosek, Montgomery, Scherr and Jones, 1977). Also, the use of repair strategies is an integral component of the tracking procedure described by DeFilippo and Scott (1978).

The tracking procedure requires the participation of two individuals, a sender and a receiver. The sender reads a short segment of a text to the receiver fails to accomplish the task, repair strategies are implemented until the receiver repeats the stimulus (i.e. the segment of text) verbatim. DeFilippo and Scott (1978) enumerated several repair strategies that could be incorporated into the tracking procedure. They include : (1) repetition of the complete segment of speech without modification (2) repetition of the segment with modifications such as changes in rhythm and intonation or changes in the articulatory movements (3) changes in the length of the segment of speech (4) instructions to the receiver with nontext comments such as labelling the error, or reminding the receiver of the topic of conversation, and (5) paraphrasing the text.

Owens and Tellen (1981) conducted a series of experiments to evaluate the effectiveness of the tracking procedure with subjects who had a severe/profound hearing loss. Initially, four subjects took part in a training program which consisted of 20 to 30 minutes of tracking, twice a week, for a period of 4 weeks. The procedure used during the trucking exercises (including the various repair strategies implemented) was similar to the procedure previously described by DeFilippo and Scott (1978).

The results of the investigation revealed that the post-training tracking scores were significantly better than the pre-training performances. In a follow-up study the authors used a slightly modified tracking procedure. Specifically, the selection of the repair strategies to be implemented was always determined by the receiver. The sender only used the type of repair strategy(ies) requested by the receiver. Owens and Telleen (1981) noted the type of repair strategies that were preferred by the hearing-impaired receivers. The authors reported that during the early stages of training the receivers tended to adopt a limited set of repair strategies. Furthermore, they requested the same type of repair strategies throughout the remainder of the training program. More than 85% of all the repair strategies requested by the hearing-impaired subjects involved the repetition of a phrase or a portion of a phrase. Requests for 'say in other words', which presumably would incorporate the use of synonyms, antonyms, rephrasing, or paraphrasing, only constituted 2% of all the repair strategies used during the tracking sessions. In a subsequent training program conducted with one profoundly hearing-impaired teenager, the investigators noted that a repair strategy that appeared to be particularly effective consisted of having the receiver repeat the portion of the message that was misunderstood rather than simply requesting a repetition of the complete speech segment (Owens and Telleen, 1981).

Two other studies investigated the effectiveness of some repair strategies in task that required the visual perception of speech. Nielson (1966) investigated the effects of repetition as a speechreading variable with normal hearing subjects. As many as five repetitions of misidentified words presented in isolation were given to the subjects. The results revealed that there was not a statistically significant improvement in performance between the visual-word recognition scores obtained

after five repetitions of the same stimulus. Similarly, Berger (1972) reported that visual consonant recognition scores did not improve significantly regardless of whether the stimuli were repeated once, twice, or three times. Nonetheless, as indicated by the results of previous investigations, repetition is by far the most common repair strategy employed to resolve communication breakdowns with hearing impaired individuals (Erber and Greer, 1973; Owens and Telleen, 1981).

Recently, programs designed to enhance communication abilities have included activities to train hearing-impaired individuals to use repair strategies effectively (Erber, 1985, 1988; Kaplan et al. 1987). Kaplan et al. (1987) describe a series of exercises specifically designed to develop the use of repair strategies such as rephrasing, use of key words, and confirmation strategies. Berger (1972) suggested that synonyms and paraphrases may constitute more effective repair strategies than simple repetition of the misunderstood message. However, there is little experimental evidence to support this hypothesis. In fact, it could be inferred from the quantitative evidence reported by Owens and Telleen (1981), that rephrasing, which presumably would include the use of synonyms and paraphrases, does not constitute very effective repair strategy since it was rarely requested by hearing-impaired subjects. This implies that the subjects did not experience much success with those types of repair strategies.

The type of repair strategy that is most appropriate for a given situation will be determined by a number of factors, including (1) cause and the extent of the communication breakdown (2) the kind of relevant linguistic and contextual cues available, (3) the appropriateness of using a substitute stimulus (4) the ability of the

sender to apply repair strategies, and (5) the cognitive and linguistic competencies of the sender as well as the receiver (Erber, 1985, 1988; Kaplan et al. 1987; Owens and Raggio, 1987). The present investigation confirmed that a simple repetition does not significantly improve the ability of subjects to correctly identify misperceived verbal stimuli. Moreover, the present findings indicate that the use of substitute stimuli such as synonyms and paraphrases constitute an effective type of repair strategy. These findings have direct implications for aural rehabilitation.

First, hearing health care professionals should be aware that repair strategies that incorporate the use of substitute stimuli are more effective than a simple repetition of misperceived stimulus. These repair strategies can be used when the hearing impaired face a communication breakdown. Second, learning to use (and to request) appropriate repair strategies should be incorporated into communication training programs provided to hearing-impaired individuals (Erber, 1985; 1988; Kaplan, et al. 1987; Owens and Raggio, 1987; Owens and Telleen, 1981). Specifically, hearing-impaired clients should be taught to request repair strategies that incorporate the use of substitute stimuli (Erber, 1988; Owens and Telleen, 1981).

The various repair strategies reviewed by Manoj (1997) in his independent project were as follows ;

1. Repetition of spoken message
2. Speak slower
3. Rephrase the message

4. Summarize the message
5. Spell the misperceived word
6. Write the message
7. Use of gestures
8. Asking general and specific questions on the topic of conversation.

Speech tracking as a procedure word to evaluate communication abilities. There are other strategies which can be adopted when breakdown occurs. These strategies can be grouped into 3 categories.

1. Use of visual and situational cues.
2. Manipulation of physical environment.
3. Constructive response to auditory failure.

These may also include : Use of visual cues. One of the more productive compensatory communication strategies word in difficult listening situation is increased reliance of the nonverbal cues inherent in all communication settings. These include writing down, finger spelling and signing the word or words which the receiver cannot lipread. This strategy is based on the assumption that lip movements, facial expressions, gestures, situational cues offer meaningful supplementary information speechreading is thought to be a more comprehensive term suggesting use of a broader scope of visual cues (facial expressions, gestures etc.) in addition to lipmovement. When

artificially deafened hearing subjects are used in experimental studies, the sender may choose to present the blocked words to the receiver auditorily. The time taken for each of these correction methods varies considerably.

Presenting the words auditorily or via sign is the quickest alternative while writing will probably occupy the most time. Schoepflin and Levitt (1991) found that : 'fewer than 7% of the talker-listener sequences extended beyond five trials before the word or words were recognized correctly. In the computer controlled tracking procedure described by Gnosspelius and Spens (1992), it is suggested that only repetitions be used. The last resort strategy used is to present the blocked word on a LED screen. That method takes about the same time as a repetition. It is fast and convenient and applies to both deaf and artificially deafened subjects.

SPEECH TRACKING AS A PROCEDURE TO EVALUATE COMMUNICATION ABILITIES :

CONNECTED DISCOURSE TRACKING (CDT)

Connected discourse tracking (CDT), developed by DeFilippo and Scott (1978), has been widely used in aural rehabilitation as both an evaluative instrument for determining the effectiveness of sensory aids, such as hearing aids, tactile aids, and cochlear implants, and as a training procedure to improve speechreading skills in hearing impaired listeners.

The tracking task attempts to simulate normal conversation more closely, while maintaining some control of the content of the interaction. Thus, it provides a closer approximation to every day life situations encountered by hearing impaired persons (Dempsey, Levitt, Josephson, and Porazzo, 1992) . CDT involves verbatim repetition of text transmitted from a talker to a listener.

In speech tracking, the sender reads phrase by phrase. The receiver is required to repeat back what is said without any errors. If errors are made, the sender repeats the phrase or uses other strategies to enable correct identification. At the completion of a specified time period (usually 5 to 10 minutes), the number of words correctly identified is calculated and divided by the time elapsed to give a word per minute (wpm) rate. For example, if a subject is able to correctly repeat back 356 words in a 10 minute speech tracking sessions he or she has a track integrate of 35.6 wpm.

The method has a number of important advantages :

1. The procedure is a straight forward one and requires little training for either the sender or receiver and no special equipment.
2. Speech tracking has high face validity as it, in part, replicates every day communication using connected discourse. A Tye-Murray and Tyler (1988) point out, specialists desire a test with a high face validity, on that indexes how well a subject recognises speech encountered in normal everyday day life.

Material can be drawn from a virtually unlimited number of sources and can be selected to meet the language skills and lipreading ability of individual subjects.

3. It provides a time-based measure of communicative effectiveness. The use of prepared text, together with the verbatim repetition aspect, allows control of the linguistic content of the task, as compared with uncontrolled conversation. These features permit the assessment of individuals with the same test materials.
4. In addition, materials can be selected that are appropriate to the linguistic level of a particular individuals.
5. It is easy to administer and easy to score (Spens, Gnosspelius, Ohngrean, Plant and Risberg, 1992).
6. CDT also has high intrinsic motivation for the listener, and the supply of available stimulus material is inexhaustible (Gnosspelius and Spens, 1992).

Typically the talker makes a decision as to the most appropriate strategy for any particular missed segment, and employs it, moving on to another strategy if necessary. Some of these correction strategies require more active involvement of the talker than others. Tracking is typically thought of as a "synthetic" train in procedure (Alcantara, Cowan, Blarney and Clark, 1990) in that the use of connected text encourages the use of context cues and other "top-down" aspects of processing. However, DeFillippo (1992) noted that the choice of correction strategies can introduce a more "analytic", or bottom up aspect to the task. In particular, she argued that phoneme level corrections served as an instructional device to teach the link between language and perception.

The number and selection of correction strategies provides an uncontrolled variable in testing. The ways in which a talker uses correction strategies, may influence tracking performance. Strategy biases, the skill of the receiver in using linguistic cues, the skill of the talker in providing appropriate corrections (Matthies and Carney, 1988), and the assertiveness of the receiver in telling the talkers what to say, all affect tracking rate effectiveness (Matthies and Carney, 1988; Tye-Murray and Tyler, 1988). Facial expressions, head movements, degrees of rapport, use of positive reinforcement, and motivation for participation all vary across talkes (Sparks, Ardell, Bourgeois, Weidemer and Kuhl, 1979). Talkers also vary in acoustic characteristics, including voice fundamental frequency, intonation, and speech rates, as well as speech readability (Lesner and Kricos, 1981; Tye-Murray and Tyler, 1988). Motivation, topic familiarity, and language proficiency all affect the outcome of CDT as well (Tye-Murray and Tyler, 1988), Schoepflin, and Levitt, (1991).

TEXT DIFFICULTY :

Text selection is yet another uncontrolled factor, Hochberg, Rosen and Ball (1989) have investigated the effect of the sender-receiver pair and text difficulty and conclude that it is not appropriate to compare tracking results cross different sender-receiver pairs, it is intuitively obvious that changing the test difficulty will have an effect on the CDT score. Another variable related to test difficulty and sender characteristics is the sender's choice of average number of words per phrase. There is a range of words per phrase which is reasonable, not too many and not too few.

However, there will always be an influence from the average number of words per phrase. Too many words per phrase will increase the probability of errors and too few will increase the proportion of turn taking time. However this parameter can be kept under control by segmenting the text in phrases (lines) of appropriate lengths. A subject's ability to lipread a certain text could be measured in corrected words per conveyed words. That is a relative measure strongly related to the CDT score.

SPEAKING RATE

Clear speech to an important prompting strategy permitted, such that the talker articulated more clearly when presenting text after the listener had missed part of the passage. Slowing the rate of speech in a repetition changing the stress pattern of a word within a phrase, prolonging continuant phonemes within a word, or emphasizing top consonant in a phrase could be used when simple repetition of the word or phrase did not elicit a verbatim response.

The speaking rate is an uncontrolled sender-receiver characteristic, numerically affecting the tracking score very much. The faster the sender presents the material, the more words are possible to convey per time unit. This will have an increasing effect on the tracking score. However, the presentation rate will also have an effect on the number of blocked words, which will indirectly influence the tracking score. The presentation rate as well as the response rate may to some extent vary at random, by bias, will or motivation (Tyler, Murray and Tyler, 1988). The parameter seems difficult to control.

REPAIR STRATEGIES TO BE USED IN SPEECH TRACKING :

The lack of a standardized protocol for dealing with breakdowns or 'blockages' is a great problem (Owens and Telleens, 1981) in understanding, when the receiver is unable to lipread a certain word or a phrase. Schoepflin and Levitt (1991), for example, found large differences in the correction or 'repair' strategies used by experimenters in various studies using CDT as an evaluation method.

Consequently, they argued, that the procedures is unstandardized and subject to a number of methodological variables. There have been attempts to specify the procedures to be used when blockages occur but none of these appear to have won wide acceptance.

De Filippo and Scott (1978) in their initial description of the method outlined the protocol they used to resolve blockages. If the repetition does not match the text exactly, the talker (a) chooses to present the segment again, making no change, modifying the style of presentation (especially timing and exaggeration of speech movements), shortening the segment to focus on a phrase, word, syllable or sound, or lengthening the segment to review or preview phonetic or linguistic context; (b) chooses to instruct the receiver with context comments by labelling the error, labelling the topic or paraphrasing the text; or chooses to combine or sequence several strategies. The basis for the talker's decision necessarily depends on the receiver's errors and changes as receiver skill changes (De Filippo and Scott 1978).

Owens and Telleen (1981) and Owens and Raggio, (1987) attempted to shift the responsibility for overcoming blockages to the receiver. In their adaptation of the method, the receiver is trained to use a series of questions or requests when breakdowns occur. This approach has many benefits in training but in practice the receiver's ability to use these strategies varies widely.

As a result, the amount of benefit derived will vary widely from receiver to receiver and will greatly influence the tracking rate obtained in experimental studies.

LANGUAGE CHARACTERISTICS

Language differences will be a need for some scaling factors to be used for across-language comparisons of tracking results.

SCORING METRICS

If different scoring metrics are used this will of course disturb comparisons of CDT results. Tracking rate are obtained via lipreading alone and lipreading supported by a number of different tactile aids reported by various researchers. It should be pointed out that probably all authors have used a last resort correction strategy that is based on another modality such as audition, finger spelling etc., The w.p.m. score will then not truly represent the test condition of lipreading (De Filippo, 1992). In some cases, different researchers evaluated the same aid and yet obtained very different results.

In CDT passage being used is presented in logical linguistic units of appropriate lengths. The receiver has to repeat back exactly what was presented with no deviations from the printed text. Sometimes the receiver is able to repeat the entire phrase or sentence after only one presentation. On other occasions, the receiver may 'block' on a particular word or series of words and require one or more repeats of the word or words that are creating difficulties. Other strategies such as those discussed above may also be used to overcome blockages. However, if the receiver is unable to correctly identify the word or words even after repeats, and the sender is forced to resolve the

problem by using a presentation method other than that being evaluated. For example, the sender may be forced to write down or sign the word(s) creating difficulties to the receiver.

The two parameters that influence the tracking score - The ceiling rate (L_c) contains both the sender's the receiver's speaking rate and the turn taking times. It is obviously independent of the repair strategies used, as it is calculated only on non blocked works. It can vary considerably between different sessions. The adaptation of their own speech made by people talking to hearing impaired persons, as reported by Picheny et al. (1986) is probably reflected in L_c 's mentioned dependence of W_{pb} . i.e., Relative number of blocked words. They found the more well articulated and slower 'clear' speech presented with about half the rate (100 w.p.m.) compared to conversational' speech (200 w.p.m). It is obvious that the experienced communication difficulty in a lipreading situation will make talkers use the clear speech mode, which has significantly higher intelligibility (Picheny, Durlach and Braida, 1985; Plant, Gnosspeilius and Spens 1994).

The faster the sender presents the material, the more words are possible to convey per time unit. However, at very low presentation (ceiling) rates lipreading is difficult and sequence of words maybe difficult to remember (Plant, Gnosspeilius and Spens, 1994). This will cause a high proportion of blocked words. For presentation rates approaching more natural ranges blocked words will decrease and the tracking score will improve both from an increased ceiling rate and the lowered proportion of blocked words. At a certain rate of presentation, the score will stop becoming improved because the proportion of blocked words will also increase to much and

cause a negative net change of the tracking score. An important consequence is that there will be presentation rate for each sender-receiver pair that gives a maximum tracking rate.

Using the numerical model of the speech tracking procedure it has been shown that the tracking rate and particularly the relative benefit expressed as relative increase in the aided condition will depend very much on the ceiling rate (L_c), the relative number of blocked words (W_{pb}) and the relative loss per blocked word (k). It also depends on language characteristics and scoring metrics. If the next material is too difficult, end effects could introduce unnecessary variability. The only way to circumvent the non-predictable influence of a varying ceiling rate (L_c) is to monitor its constancy. The k values should also be stable or compensated for. The proportion of blocked words (W_{pb}) would then be the only parameter to influence the tracking rate. If the ceiling rate is allowed to vary it still should be monitored. The relative improvement of an aid could then be calculated at a specified ceiling rate or eventually for the respective maximum tracking rates.

QUESTIONS OF VALIDITY :

Perhaps the only meaningful validation of the tracking procedure can be in a comparison of wpm scores and the outcome of an actual communication exchange (such as occurs in a classroom between teacher and deaf child). The pace and format of communication during tracking do seem to be similar to aspects of everyday communication, especially with the hearing impaired, and this fact does lend face

validity to the procedure. The use of textual material in place of lists contributes further toward stimulating a realistic situation that requires continuous processing of speech at more than one level. That is, tracking seems to tap the same perceptual skills required by other intelligibility tests plus a wider range of communication skills as well.

There are a variety of ways that tracking can be applied, for clinical and experimental purposes, with suitable modifications. For example, ongoing work indicates that tracking improves lipreading in hard-of-hearing adults and can be adapted for auditory training of deaf children.

In some cases, to implement the procedure for training speech reception, one effective modification is to optimize and then gradually degrade clarity of the visual signal, auditory signal, or other relevant aspect of the communication system. Difficulty of text can also be manipulated to make the task easier or to challenge a particular client.

In addition to speech reception training, tracking can provide speech production training with an adjustment in the talker's criteria for accepting the receiver's repetitions. The receiver would be required to attend to his own speech as he repeats, trying to match the sound, the feel, or the look of the message as well as its content.

Aside from its training applications, there are potential uses of tracking for evaluation, particularly of hearing aids. Present procedures can analyze user reception of certain characteristics of short segments of speech (from features to words to sentences), but there is a need for some measure of ability to follow ongoing speech.

Of course, with tracking, as with all other tests, not only alternative communication channels, but receivers, talkers, and materials also can be evaluated by varying a single element at a time.

As stated above, tracking may make a useful addition to a battery of techniques when an approach that fractures speech to measure reception of its parts cannot substitute for an approach that evaluates communication behaviour. Whether applied to training or evaluation, in clinics or research, tracking will be of greater value if it can bestir interest in refining speech reception techniques that use ongoing speech as material and that provide for generalization of skills from training and evaluation to actual use.

COMPUTER ASSISTED TRACKING PROCEDURE

The computer-assisted tracking procedure suggested by Gnosspelius and Spens (1992) produces a very detailed protocol. Information about the transmission time for each phrase is given as raw data as well as the average L, Lc, k values and proportion of blocked words (Wpb). Other interesting parameters like the total number of first interventions, second interventions etc., upto the last resort resolution and the respective times taken are also given or can easily be calculated. General measures of the text material like average word length, phrase lengths, distributions and standard deviations can be calculated by the programme.

As the text file is stored in the computer, it is also easy to assess the general text difficulty estimated by standardized methods, such as Flesch Reading Ease, Flesch Grade Level, Flesch Kincaid or Gunny-Fog Index found in modern word processors. It would certainly help interpreting speech tracking results if the ceiling rate (or even better the sender's presentation rate) the proportions of correct words as well as the average k values used, were reported as complementary data to the CDT results.

If this kind of information was frequently published, informal standards of these parameters would probably appear. It is hoped that the assessment of more data from the tracking session like those mentioned will make the interpretation of tracking results more interesting and informative than today.

Hearing - impaired must be able to tell those they wish to communicate with, how they are best able to receive and send information. To accomplish this individuals must possess an accurate understanding of their own receptive and expressive communication strengths and weaknesses. Only after carefully assessing one's strength and weakness is an individual ready to relay what is needed to communicate successfully. (Palmer, 1988).

METHODOLOGY

The present evaluation was undertaken to investigate the improvement in communication skills of a hearing impaired individual after being taught and trained to use communication strategies effectively.

Hearing impaired individuals should be aware of the variety of possible alternative communication strategies. Available knowledge and practice of them can make communication more effective for them. By using strategies the hearing impaired individuals will be able to handle communication breakdown more effectively and will get a feeling of confidence of being able to control the uncertainties of a speech reading situation (Palmer, 1988).

SUBJECTS:

A group of 9 subjects who met the following criteria were chosen:

- All the subjects had volunteered for this study.
- Both males and females above the age of 18 years were considered.
- No formal training for prior communication strategies should have been given.
- All subjects should have MODERATE TO MODERATELY SEVERE hearing loss and wear a hearing aid prescribed by an audiologist.
- They should have no additional impairment such as a language, speech or visual problem. They should wear corrective lenses if they had visual problem.
- The subjects taken should have studied in English medium school at least from junior high to higher secondary school.

TEST PROCEDURE:**ENVIRONMENT:**

- The environment chosen for testing the subjects was NOISE FREE and with minimal distraction.
- A single room was used with adequate lighting and large enough to seat the subject and the tester.
- The subjects were seated on a chair in a comfortable posture.
- The subject was made to sit facing the experimenter at a distance of 3-4 feet.
- Adequate lighting was present and made to fall on the speakers face.

TEST MATERIAL:

Passages from English text books of VIIth, VIIIth and IXth standards were selected. The passages were chosen such that they were not too difficult or too simple. This selection was done by 10 individuals whose minimum education level was high school. These individuals differed from each other in terms of their professional background.

PROCEDURE:

The complete procedure was divided into four phases:

Phase I : Normative data was collected

Phase II : Pre-therapy evaluation of the hearing impaired subjects.

Phase III: Therapy sessions to familiarise the subjects with the communication strategies used.

Phase IV : Post-therapy evaluation of the hearing impaired subjects

PHASE I: NORMATIVE DATA:

Normative data of words per minute was collected using the speech tracking procedure on 20 normal hearing individuals. All the normal hearing subjects should have studied in English Medium School at least from junior high to higher secondary school. Equal number of males and female subjects above the age of 18 years were considered. They did not have any prior history of hearing impairment or any speech and language deficits.

The word per minute (w.p.m.) scores of the hearing impaired individuals was then compared with the scores of the normal hearing individuals.

PHASE II : PRE-THERAPY EVALUATION:

The performance of the hearing impaired individuals was evaluated using the speech tracking procedure (De Fillippo and Scott - 1978) before they were taught the various communication strategies. The procedure involved the talker to read from a prepared text to the receiver, segment by segment and the receiver had to repeat back what was said to him. The segment length was determined by what the talker decided would be logical linguistic constituent. This should not exceed what the receiver could not remember long enough to repeat back and would be instrumental in securing the receivers immediate pre-therapy) and ultimate (post-therapy) success, If the repetition did not match the written text exactly, the talker would chose to combine or sequence several strategies to elicit a repetition that matched the text verbatim without the use of non-speech related cues (for Ex: extra facial grimaces). Using the above

procedure baseline performance of the hearing impaired individual was evaluated for a duration of 10 minutes. From this the words per minute (w.p.m.) was then calculated.

PHASE III : (THERAPY):

This phase consisted of the therapy sessions wherein the hearing impaired subjects were trained to use the communication strategies effectively (Manoj - 1997, Appendix-I). Five sessions were carried out. Each session was for a duration of 45 minutes, out of which the last 5 minutes were utilised to evaluate how effectively the hearing impaired was able to make use of these strategies.

The strategies were first given to the subject to read and understand. Following this the therapist placed placards containing written forms of the strategies in front of the subject. This was to enable him to select the appropriate strategies, whenever there was a communication breakdown. During the last two therapy sessions the written forms of the strategies were withdrawn. The subjects were told to improve their word per minute rate to approximate what normals were able to perceive.

PHASE IV : POST-THERAPY EVALUATION :

This phase involved the evaluation of the hearing impaired individuals again after they had learnt to use these strategies, the sample was taken for 10 minutes and the number of words per minute was then calculated.

RESULTS

The word per minute (w.p.m) scores for speech tracking were calculated for the pre-therapy and post-therapy sessions for all the 9 hearing impaired subjects. Also the w.p.m. scores was calculated for 20 normal hearing subjects on whom the normative data was collected.

There were 3 evaluations done to compare the differences in the w.p.m. scores. Analysis using the 't' test was carried out for the following data.

I. EVALUATION:

Comparison of pre-therapy and post-therapy scores of the hearing impaired subjects.

II. EVALUATION:

Comparison of the pre-therapy scores of the hearing impaired with that of the normative data.

III. EVALUATION:

Comparison of post-therapy scores of the hearing impaired individuals with that of the scores of the normal hearing group.

TABLE 1:

Mean and S.D. for w.p.m. scores obtained on normal and hearing impaired subjects.

Subjects	Mean w.p.m. scores	Standard deviation
Normal hearing	83.24	11.32
Hearing impaired (Pre-therapy)	45.7	11.48
Hearing impaired (post-therapy)	66.6	12.21

Table 1 gives the mean and standard deviation for w.p.m. scores on the speech tracking test for the normal hearing and the hearing impaired subjects. The normal hearing subjects had a mean w.p.m. score (83.24) that was much better than that of the hearing impaired. For the hearing impaired group, the pre-therapy and the post-therapy mean scores were 45.7 and 66.6 respectively. While standard deviation was 11.48 and 12.21 respectively.

EVALUATION 1:

Comparison of pre-therapy and post-therapy scores of the hearing impaired subjects:

The 't' test for a small sample was applied to find out whether the strategies used by the subjects were useful in improving the final w.p.m. scores.

When the mean of the pre-therapy and post-therapy score was compared, the 't' test scores (also known as critical ratio) obtained was 3.73 and this score was found significant at 0.05 and 0.01 level of significance.(Table 2)

TABLE 2:

Results of 't' test and level of significance for w.p.m. scores obtained on normal hearing and hearing impaired subjects:

	't' test scores	level of significance
Pre-therapy VS Post-therapy Scores	3.73	at 0.05 & 0.01 level
Pre-therapy VS Normative data	8.12	-do-
Post-therapy VS Normative data	3.45	-do-

This reflects the fact that there was a noted improvement in the w.p.m. scores after the strategies were taught to the subjects.

EVALUATION II:

Comparison of pre-therapy scores of the hearing impaired with that of the normative data:

There was a significant difference at 0.05 and 0.01 level between the pre-therapy scores and that of the normative data as seen in Table 2. This indicates the

fact that hearing impaired subjects were performing much poorer than the normal hearing subjects in terms of communication in the pre-therapy stage.

EVALUATION HI:

Comparison of post-therapy scores of the hearing impaired individuals with that of the scores of the normal hearing group:

There was a significant difference between the post-therapy w.p.m. scores when compared to the normative data (table 2). Once again the normal hearing subjects obtained a much higher score than the hearing impaired group. This occurred despite the fact that there was a significant improvement in scores after therapy was administered as seen in table 1.

DISCUSSION

From this study it is evident that the hearing impaired are unable to communicate as effectively as that of normal hearing subjects.

Therapy, where communication strategies were taught to the hearing impaired individual, did help improve their abilities to interact verbally. Though there was a significant improvement after therapy, they still continued to perform way below that of the normal hearing individuals. This indicates that the hearing impaired individuals have considerable room for further improvement and communication abilities may continue to improve if therapy was administered for longer period of time.

Motivation was also seen to influence their performance helping them to realise their importance and use of appropriate strategies when and where it was required. Even though there was a significant improvement after therapy they still continue to perform way below that of the normal hearing individuals. It is possible that if therapy is administered for a longer period of time, the hearing impaired individuals communicating abilities may improve considerably to be in par with that of the normals.

In conclusion it is highly advocated that hearing impaired individuals facing problems in communication should be taught strategies which would enhance their ability to interact verbally with each other.

Owens and Telleen (1981) noted that more than 85% of the repair strategies requested by the hearing impaired person involved the repetition of a phrase or a portion of a phrase. The investigator noted that repair strategies that appeared to be

particularly effective consisted of having the receiver repeat the portion of the message misunderstood rather than simply requesting the repetition of the complete speech segment. Repetition has been considered by far the most common repair strategy employed to resolve communication breakdown (Erber and Greer, 1973; Owens and Telleen,1981).

In this study it was also seen that subjects preferred to use repetition more often than other strategies. Strategies such as 'speak slower'¹ or even 'spell the word'. The latter strategy was used despite the fact that they were asked to use more effective communication strategies.

SUMMARY AND CONCLUSION

Our social behaviour is essentially a communicative behaviour. To communicate is to care, share and connect with each other (Hegde, 1991).

Hearing is an important aspect essential for normally acquired verbal communication. Adult with hearing impairment may experience communication and vocational ramification regardless of age at onset of hearing loss. Thus the handicapping effects of hearing loss revolve around societal attitudes towards the disability in general and communication problem in particular. Communication strategies has played very important role in the rehabilitation of the hearing impaired. These strategies if used effectively can help bridge the gap in communication between the normals and the hearing impaired.

This study evaluates how effective the use of communication strategies can be in improving the verbal interaction skills of the hearing impaired when faced with the communication breakdown.

The study was carried on 9 hearing impaired subjects who were taught to use various communication strategies. Each subject was given 5 session of therapy during which they were taught to use these strategies. Their pre-therapy and post-therapy communication abilities were evaluated using the speech tracking procedures developed by Di Fillipo and Scott (1978).

There was a statistically significant difference between the pre and post therapy score. All 9 subjects taken for the study had reported a significant improvement in their communication skills, thus communicating more efficiently after using these strategies.

IMPLICATION FOR FUTURE RESEARCH:

- 1. This study can be carried out on a larger population.
 2. Various degrees of hearing loss or individuals with varying speech identification scores can be considered to note the changes, if any, in the words per minute score of the hearing impaired.
 3. A similar study can be carried out in various Indian Languages.
 4. This study can be done for the subject of various age, to compare the improvement in communication.
 5. The generalization in use of the communication strategies can be evaluated after a period of one or two months after the cessation of therapy.

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LIMITATION OF THE STUDY:

- 1. The sample size considered in this study was very small.
- 2. Only moderate - moderately severe category of hearing loss was studied.
- 3. English was the only language considered and all the subjects had to be well versed in reading English.

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APPENDIX -1

The communication strategies used in this evaluation have been listed in a study developed by Manoj (1997).

RANKING OF THE COMMUNICATION STRATEGIES BY COMMUNICATION EXPERTS :

(Higher ranked strategies appear earlier and lower ranked strategies appear later in the order)

1. Avoiding conversation in a noisy environment
2. Request for repetition of spoken message
3. Request to speak slower
4. Communicating in a well illuminated environment with adequate light on speaker's face
5. Request for rephrasing the message
6. Anticipating possible vocabulary and being prepared for it.
7. Asking a general question on the topic of conversation
8. Asking a specific question on the topic of conversation
9. Moving closer to the speaker
10. Request for gesturing the message misperceived
11. Request for summarising the message
12. Request for a written message
13. Request for spelling the misperceived word