EVALUATION OF COMMUNICATION THERAPY AS AURAL REHABILITATION

by

William J. Feldbruegge

B.A., The University of Saskatchewan, 1990

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF SCIENCE
in
THE FACULTY OF GRADUATE STUDIES
(School of Audiology and Speech Sciences)

We accept this thesis as conforming
to the required standards

THE UNIVERSITY OF BRITISH COLUMBIA
April, 1994
© Bill Feldbruegge, 1994
In presenting this thesis in partial fulfilment of the requirements for an advanced degree at the University of British Columbia, I agree that the Library shall make it freely available for reference and study. I further agree that permission for extensive copying of this thesis for scholarly purposes may be granted by the head of my department or by his or her representatives. It is understood that copying or publication of this thesis for financial gain shall not be allowed without my written permission.

School of \textit{Audiology and Speech Sciences}

The University of British Columbia
Vancouver, Canada

Date \textit{April 21, 1994}
ABSTRACT

This research evaluated an aural rehabilitation program based on methods outlined by Erber in his book *Communication Therapy for Hearing-impaired Adults* (1988). This approach is linguistically based, focuses on the hard-of-hearing client’s ability to participate in conversations and provides additional therapy to a person who is a familiar communication partner of the client. The program attempts to increase the client’s and the communication partner’s metalinguistic knowledge and their awareness of how language is used in conversations. Therapy is intended to facilitate the use of this knowledge in the prevention and repair of conversation breakdown and thereby enable the hard-of-hearing client to participate more fully in conversations.

This research covered three areas of investigation: benefit evaluation for both the hard-of-hearing client and the communication partner; evaluation of the program delivery by comparing benefits associated with four and eight hours of therapy; and a critical examination of the evaluation methods available for assessing conversations.

The results indicated that both participants derived benefits from the therapy program. The subject of the research, a 19-year-old male with a severe-to-profound hearing loss, benefited from therapy predominantly by becoming more able to effectively repair conversations and by becoming more confident and assertive in conversations. The communication partner benefited from therapy by becoming more efficient in relaying information to the subject and by improved ability to make conversational repairs. Other benefits were in the form of increased satisfaction in the way therapy helped both of them to engage in conversations.

Examination of the data that indicated benefit associated with therapy suggested that eight hours of therapy were of more benefit than four hours. This information was limited, however, and these results are not conclusive.
Examination of the data collected by objective and subjective evaluation methods showed that the results assessing benefit did not always agree. It was concluded that the different evaluation methods were each suited to different communication related measures. The clinical implication is that a variety of measures may be required for evaluation purposes, because presently no single measure samples the wide spectrum of communication skills or client concerns.

As the hard-of-hearing subject in this study was a young adult with a significant congenital hearing loss, the results suggested that this approach may be valuable to a variety of clients, beyond the intended focus of adults with acquired hearing loss. The research supports the belief that substantial benefit can be derived by including a partner in the therapy process.
TABLE OF CONTENTS

ABSTRACT ii
TABLE OF CONTENTS iv
LIST OF TABLES viii
LIST OF FIGURES x
ACKNOWLEDGEMENTS xi
CHAPTER 1 REVIEW OF THE LITERATURE
  1.0 INTRODUCTION 1
  1.1 EFFICACY STUDIES AND EVALUATION TECHNIQUES 3
  1.2 OVERVIEW OF AURAL REHABILITATION PROGRAMS 6
    1.2.1 Definition of Terms 6
    1.2.2 Conventional Practices and Approaches in Aural Rehabilitation 8
  1.3 DESCRIPTION OF ERBER PROGRAM 12
    1.3.1 Erber’s Clinical Model of Communication 15
    1.3.2 Therapy Activities 17
    1.3.3 Conversational Fluency 19
  1.4 COMMUNICATION MODEL AND CONVERSATION RESEARCH 20
    1.4.1 A Communication Model 21
    1.4.2 Redundancy 25
    1.4.3 Context 27
    1.4.4 Contingent Sequences and Turn Taking 31
    1.4.5 Speech Act Theory 34
  1.5 HYPOTHESIS 36

CHAPTER 2 METHODS
  2.1 RESEARCH DESIGN 40
2.2 SUBJECT and communication partner

2.2.1 Subject

-2.2.1.1 Speech Reception Threshold in Multi-Talker Babble
-2.2.1.2 Speech Perception in Noise
-2.2.1.3 Test Results

2.2.2 Communication Partner

2.3 THERAPY MATERIALS AND PROCEDURES

2.3.1 Organization of Therapy Sessions and Materials
2.3.2 HELOS

2.4 EVALUATION PROCEDURES

2.4.1 Evaluator

2.4.2 Objective Evaluation Measures

-2.4.2.1 TOPICON
-2.4.2.2 Tracking

2.4.3 Subjective Evaluation Measures

-2.4.3.1 Hearing Performance Inventory
-2.4.3.2 Interview

CHAPTER 3 ANALYSIS

3.0 DATA ANALYSIS

3.1 TRANSCRIPTION

3.2 CODING OF CONVERSATIONAL FLUENCY MEASURES

3.3 DEFINITION OF REPAIR SEQUENCE CATEGORIES

3.3.1 Clarification Requests
3.3.2 Repair Strategies
3.3.3 Tracking Analysis Decisions

3.4 REPAIR SEQUENCE ANALYSIS
CHAPTER 4 RESULTS

4.1 OBJECTIVE MEASURES

4.1.1 TOPICON

- 4.1.1.1 Conversational Fluency Measures
- 4.1.1.2 Requests for Clarification: TOPICON
- 4.1.1.3 Repair Strategies: TOPICON
- 4.1.1.4 Repair Sequence Data: TOPICON
- 4.1.1.5 Verbal Protocol & Comprehension Questions: TOPICON

4.1.2 Tracking Data

- 4.1.2.1 Rates
- 4.1.2.2 Requests for Clarification by Ss: Tracking
- 4.1.2.3 Repair Strategies used by CP: Tracking
- 4.1.2.4 Repair Sequence Data: Tracking
- 4.1.2.5 Verbal Protocol & Comprehension Questions: Tracking

4.2 SUBJECTIVE MEASURES

4.2.1 Hearing Performance Inventory

4.2.2 Interview

- 4.2.2.1 Use
- 4.2.2.2 Benefit
- 4.2.2.3 Satisfaction

4.3 SUMMARY OF RESULTS

4.3.1 Objective Measures

4.3.2 Subjective Measures
CHAPTER 5 CONCLUSION AND DISCUSSION

5.1 GOALS OF STUDY

5.2 SUMMARY OF RESULTS

5.2.1 Objective Measure: TOPICON

5.2.2 Objective Measure: Tracking

5.2.3 Subjective Measure: Hearing Performance Inventory

5.2.4 Subjective Measure: Interview

5.3 EXAMINATION OF HYPOTHESES

5.3.1 Hypothesis 1: Benefit Provided to the Hard-of-hearing Subject

5.3.2 Hypothesis 2: Evaluation of Benefit to the Communication Partner

5.3.3 Hypothesis 3: Evaluation of Benefit after Four and Eight Hours of Therapy

5.3.4 Hypothesis 4: Agreement Between Objective and Subjective Measures

5.4 CLINICAL IMPLICATIONS

5.5 FURTHER RESEARCH

5.6 SUMMARY AND CONCLUSION

REFERENCES

APPENDICES

1. THERAPY ACTIVITIES

2. S’s AUDIOGRAM

3. VERBAL PROTOCOL QUESTIONS

4. INTERVIEW QUESTIONS
# LIST OF TABLES

<table>
<thead>
<tr>
<th>TABLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
<td>Comparison of classification terms in this study study, in Garvey (1977) and in Cassie and Rockwell (1993)</td>
</tr>
<tr>
<td>4.1</td>
<td>Analysis data &amp; derived measures: Conversational Fluency</td>
</tr>
<tr>
<td>4.2</td>
<td>Solicited and unsolicited requests for clarification made by S and D in TOPICON conversations</td>
</tr>
<tr>
<td>4.3</td>
<td>Elicited and unelicited repair strategies used in TOPICON conversations by S and D</td>
</tr>
<tr>
<td>4.4</td>
<td>Repair sequence data: Turns, clauses, sequences, and repairs made with one cue in TOPICON conversations</td>
</tr>
<tr>
<td>4.5</td>
<td>S's Answers to Verbal protocol and comprehension questions: TOPICON</td>
</tr>
<tr>
<td>4.6</td>
<td>Tracking rates: Median (and interquartile range) in syllables per minute for narrative and descriptive text in quiet and noise with senders CP and D</td>
</tr>
<tr>
<td>4.7</td>
<td>Tracking rate increases from first to final evaluations in syllables per minute for senders CP and D</td>
</tr>
<tr>
<td>4.8</td>
<td>Requests for clarification made by S in tracking with senders CP and D</td>
</tr>
<tr>
<td>4.9</td>
<td>Repair strategies used by CP in tracking as percent of all strategies used</td>
</tr>
<tr>
<td>4.10</td>
<td>Repair sequence data for CP in tracking: Length of presentation segment, the ratio (and percentage) of initial correct responses, segments repaired with one cue and the rate of the initial correct + repaired with one cue</td>
</tr>
</tbody>
</table>
TABLE

<table>
<thead>
<tr>
<th>TABLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.11</td>
<td>Repair sequence data for D in tracking: Length of presentation segment, the ratio (and percentage) of initial correct responses, segments repaired with one cue and the rate of the initial correct + repaired with one cue</td>
</tr>
<tr>
<td>4.12</td>
<td>Percentage of tracking comprehension questions answered correctly</td>
</tr>
<tr>
<td>4.13</td>
<td>Verbal protocol: Estimates of comprehension and effort in tracking</td>
</tr>
<tr>
<td>4.14</td>
<td>Responses on 13 subtests of the Hearing Performance Inventory by S before and after therapy</td>
</tr>
</tbody>
</table>
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>FIGURE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>16</td>
</tr>
<tr>
<td>Erber's clinical model of the communication process</td>
<td></td>
</tr>
<tr>
<td>1.2</td>
<td>24</td>
</tr>
<tr>
<td>A model of the perceptual process, after Solley and Murphy (1960)</td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td>41</td>
</tr>
<tr>
<td>Evaluation and therapy schedule</td>
<td></td>
</tr>
<tr>
<td>2.2</td>
<td>58</td>
</tr>
<tr>
<td>Tracking conditions</td>
<td></td>
</tr>
<tr>
<td>4.1</td>
<td>94</td>
</tr>
<tr>
<td>Tracking rates in syllables per minute: Narrative and descriptive text in quiet and noise with senders CP and D</td>
<td></td>
</tr>
<tr>
<td>4.2</td>
<td>104</td>
</tr>
<tr>
<td>Text segments repaired with one cue and segments repaired with one cue plus initial correct responses for narrative text with senders CP and D</td>
<td></td>
</tr>
<tr>
<td>4.3</td>
<td>104</td>
</tr>
<tr>
<td>Text segments repaired with one cue and segments repaired with one cue plus initial correct responses for descriptive text with senders CP and D</td>
<td></td>
</tr>
</tbody>
</table>
ACKNOWLEDGEMENTS

I would like to express my gratitude to S, CP and the rest of their family, who all participated in this project with enthusiasm, humour and commitment. I wish them continued success and good fortune.

Additional thanks to the faculty and staff at the School of Audiology and Speech Sciences – in particular, to my supervising committee who provided guidance and encouragement. And to my classmates who were ready to discuss, debate and raise a glass or two on occasion.

Final thanks to my wife Lynn, who always gave me encouragement and support.
CHAPTER 1
REVIEW OF LITERATURE

1.0 INTRODUCTION

This thesis reports on research that was undertaken to evaluate the aural rehabilitation program outlined by Erber in his book *Communication Therapy for Hearing-impaired Adults* (1988). Erber’s approach differs from many conventional aural rehabilitation programs in that it is linguistically based, focuses on the hard-of-hearing client’s ability to participate in conversations and provides therapy for a person who is a familiar communication partner of the client. The program attempts to increase the client’s and the partner’s metalinguistic knowledge and their awareness of how language is used in conversations. Therapy is intended to facilitate the use of this knowledge in the prevention and repair of conversation breakdown and thereby enable the hard-of-hearing client to participate more fully in conversations.

The research covered three areas of investigation: evaluation of the benefits provided to both the hard-of-hearing subject and the communication partner, evaluation of program delivery by comparing the benefits associated with four and eight hours of therapy, and an examination of the evaluation methods that were used in this study.

The evaluation of benefit examined whether this therapeutic approach provided benefits to the hearing-impaired subject, and if additional benefit was derived by providing therapy to the communication partner. Outcome measures were collected at five points in time, spaced at two week interval before, during and after intervention. The evaluation procedures gathered data with which to identify and quantify benefits directly associated to
therapy. The anticipated benefits were an improved ability on the part of the hearing-impaired subject and the communication partner to participate in efficient, fluent conversations.

Both objective and subjective measures were used in evaluation. The objective data were gathered in communication-related activities, and rely on the assumption that communication is observable in quantifiable behaviours that can be compared on a before and after therapy basis. The subjective data were in the form of questions and interviews about the participants' perceptions of disability and handicap, as well as their opinions about program benefits.

The evaluation of program delivery was related to the number of hours of therapy provided. An evaluation midpoint in the therapy program made possible an examination of benefits after four and eight hours of therapy. Specifically, it was of interest to determine if benefits are directly related to the number of hours of direct therapy, and if so, does eight hours of therapy provide significantly more subject benefit than four hours of therapy?

The methods by which data have been collected in this study were critically examined to determine how useful they were in evaluating communication. It is well understood that human communication is complex, but we do not posses a complete understanding of all the elements of communication, or ways in which they can be measured. The critique focused on the type of information each evaluation method provided, how informative the data was in the overall assessment of benefit, and the amount of agreement between objective and subjective evaluation measures.

This chapter reviews the literature that is pertinent to the design of this study and reports on research and theory which motivates the research questions. The starting point is a discussion about the organization of efficacy
studies, along with a proposed organizational scheme useful for evaluating communication rehabilitation programs. Other sections give a general overview of aural rehabilitation programs and describe the Erber program by detailing ways in which the communication problems of hearing impaired persons are traditionally approached, and the way in which Erber proposes they be approached.

A later section of this chapter looks at communication theory and research that examines the process by which we comprehend conversational speech. An understanding of how we use language to communicate is of obvious use in conversationally based aural rehabilitation. By understanding the process we may be able to successfully devise therapy to compensate for reduced hearing ability. Erber's approach to aural rehabilitation is based on a model of communication that identifies perceptual, linguistic and contextual components; these components are examined with reference to particular aspects of Erber's program.

1.1. EFFICACY STUDIES AND EVALUATION TECHNIQUES

Public concern with government expenditures has fed a growing demand for fiscal responsibility and restraint; these demands, of course, extend to the use of government money spent on health care. Agencies that regulate the delivery of health care have been pressed to focus on the cost of services, and the most cost effective ways in which to deliver them. Evaluations of health services, in response to calls for improved efficiency, have given most attention to cost factors alone; significantly less attention has been shown to benefit, or to a definition of efficiency that includes benefit related measures (Coyte, 1992). Competition for scarce resources is making it increasingly necessary to determine costs in relation to benefit. The need for new studies
and new evaluative methods is clear as the health care system rationalizes services and tries to balance the demands of individuals against financial limitations that restrict the greater system (Coyte, 1992; Gagne, 1992; Pichora-Fuller & Gallagher, 1992).

There are good reasons why program evaluations are needed in addition to concern about the allotment of slices from the economic pie. Chief among other reasons are ethical considerations; purveyors of health services, health service professionals and the consumers of the services, are all concerned that the best possible treatment be available. Comparative evaluation of alternate services or therapy approaches makes it possible for individuals, service providers and governments to make objective, informed choices.

An approach to program evaluation that has proven to be useful for therapy services has been to recognize discrete components of a program and different aspects of client rehabilitation. Program evaluations, in studies of communication related services, typically examine 1) outcome; 2) service delivery models, and 3) process (Schery & Lipsey, 1983; Coyte, 1992). Aspects of rehabilitation are often designated according to the client's impairment, disability or handicap. An awareness of the different areas of scrutiny assists in the proper match of evaluation instrument to questions of interest, and is important in determining the appropriate means of interpreting results.

Program evaluations with a focus on outcome measures concentrate on the benefits derived from a therapy program or approach. Service delivery evaluations look at cost effective provision of service or organizational and staff support issues. Process evaluations is concerned with details of process that define a program; they may examine admissions to a therapy program, schedule of treatments, and/or process in terms of what activities constitute the therapy. Realistically, the three areas are not mutually exclusive, nor do
studies necessarily limit themselves to only one dimension (see, for example, Shewan & Kertesz, 1984; Mussleman, Lindsay & Wilson, 1988).

In rehabilitation practice, it is useful to make a distinction between an individual's: a) physical impairment, b) disability or reduced range of abilities, and c) handicap, which can be defined as the disadvantages in life roles that result from the impairment and disability. It is recognized that a particular evaluation procedure is not always suitable across this entire gamut of client related concerns. Researchers need to consider not only what aspect of program a measure relates to, but also what aspect of client rehabilitation is being examined (Coyte, 1992).

A corollary issue in evaluation studies that has been given some attention is the critical examination of methods of evaluation themselves; in particular, examination of the validity of data collection, and ecological validity of evaluation methods (see for example, Owens & Raggio, 1987; Lomas et al., 1989; Oja & Schow, 1984; Tye-Murray & Tyler, 1988). The evaluation measures used must be sensitive enough to determine the presence of change and must provide information that, in fact, is valuable in assessing function in the world outside the clinic. There has been growing recognition that the instruments used for outcome measurement in aural rehabilitation are in need of assessment (Gagne, 1992; Coyte, 1992; Pichora-Fuller & Gallagher, 1992).

In summary, a number of fundamental concerns should govern the theory and practice of evaluation procedures:

a) concern that the evaluation method is valid; that is, does it measure what it purports to measure;

b) concern that appropriate tests are used in the evaluation and reporting of a particular aspect of communication;
c) concern that techniques and measurements are ecologically valid; that is, do the measurements relate in any way to the communication experiences of the client in everyday life.

1.2. OVERVIEW OF AURAL REHABILITATION PROGRAMS

This section will provide some definitions used frequently in discussions about aural rehabilitation and outline their application within this paper, before moving on to provide an overview of aural rehabilitation. The overview of current approaches that follows is a survey of trends in contemporary clinical practice.

1.2.1 Definition of Terms

Erber identifies his approach as “communication therapy” for hearing-impaired adults. It falls into what is generally referred to as aural rehabilitation, that is, rehabilitation therapy that attempts to lessen impairment and/or reduce handicap related to hearing loss. Definitions of aural rehabilitation vary somewhat, but they typically include a recognition of professional services designed to help persons with hearing loss (Schow & Nerbonne, 1989).

Erber uses the term communication therapy for specific reasons; it conforms to his stated intention of following a new approach aimed at resolving communication difficulties experienced by individuals with hearing loss. He indicates that his program is not outside the realm of aural rehabilitation, but rather, it signifies a new rehabilitative orientation (Erber, 1988, p.vii).

The term “rehabilitation” has general application, but there are instances where some authors choose to distinguish between habilitation and
rehabilitation. An accepted definition of rehabilitation is the restoration or renewal of some ability. A distinction can be made where the emphasis is on skill acquisition rather than restoration, as might be the case in language intervention with prelingually hearing-impaired children; it may be more technically correct to refer to habilitation in such instances. This report uses the term rehabilitation for the sake of consistency, since frequent reference is made to Erber's program, which is identified as rehabilitation therapy. This may avoid confusion when reference is made to other therapy programs, or to the subject of this study whose hearing-impairment is prelingual.

For purposes of this study it has been useful to follow a distinction made between impairment, disability and handicap, that conforms to the definition of the World Health Organization (1980). In the context of rehabilitation, impairment is meant to refer to physical, physiological or anatomical loss, or abnormality of normal function. Disability is the direct consequence of an impairment. Disability refers to the loss or reduction of normal ability resulting from the impairment. The effects that the disability has on an individual's life, and the activities or roles she/he normally performs define the handicap. The shift of focus in each case is a useful one in rehabilitation practices. In evaluation studies it is particularly useful to identify which aspect is being evaluated and to match it with an appropriate test measure (Coyte, 1992). This report follows the meanings outlined above, but these definitions have not been adopted universally, nor are they consistently used (for example, Schow & Nerbonne, 1989, choose to consider disability and handicap as synonymous terms).

The terms hearing-impairment and hearing loss are often used synonymously to mean a reduced ability to detect and/or perceive sound due to a physical impairment of the anatomical structures that support this sense.
A hard-of-hearing person is one who has a hearing loss but still uses the sense of hearing for communication purposes. Deafness has come to be a cultural designation for the community whose primary means of communication is manual/signed (American Sign Language, but also Signed English and Signe du Langue de Quebec.). By this designation, persons who use aural-oral means of communication may be considered to be hard-of-hearing, even though their hearing loss, as measured by audiological procedures, may be as great as a deaf person's.

1.2.2 Conventional Practices and Approaches in Aural Rehabilitation

Erber suggests that his approach represents a change in the way aural rehabilitation therapy is conducted. To understand Erber's methods, and this project, it is useful to understand the conventional practices and approaches of contemporary aural rehabilitation. Erber's approach does not stand in isolation, but relies on tradition and innovation. At present, as in the past, there are a number of diverse approaches and innovative practitioners who rely on their own clinical experience along with their knowledge of current scientific research. This survey provides a representative sample.

The history of aural rehabilitation has been well documented (e.g. Schmitt, 1966; Moores, 1978; Quigley & Paul, 1990 - to mention a few). The tradition goes back to the work of Ponce de Leon (1520-1584) and Bonet (1579-1620) in Spain, and includes other notables such as Abbe de l'Eppe (1712-1774) in France, and Gallaudet, who in 1817 established the residential school now known as the American School for the Deaf.

Aural rehabilitation in the present day is generally thought of as a component of audiology. The practice of audiology had its origins during World War II, when there was a rapidly growing need for evaluation and
treatment services for hearing-impaired military personnel. Over time, in North America it came to be accepted that these services would be provided by audioligists, and that rehabilitation in these instances was different from traditional education services for the deaf and hard-of-hearing (Schow & Nerbonne, 1989).

The evolution of aural rehabilitation through these channels led to programs that relied primarily on amplification, speech reading and auditory training. Some researchers and practitioners in the immediate postwar period advocated hearing aid selection procedures that acknowledged that the client and the instrument "functioned as a totality" (Carhart, 1946: p. 780). This approach recognized that hearing aids along with training programs were needed to meet the individual client's needs. Carhart (1946) recommended that connected speech be used in evaluation procedures and that clinicians consider how the instrument functions in everyday situations for the client. These recommendations are not so very far removed from basic claims made by Erber, although Erber is able to elaborate on them with the aid of some forty plus years of research.

Over the last 40 to 50 years technical advances in hearing aid design have promoted amplification to a dominant role in the practice of aural rehabilitation. Generally, speech reading is an ancillary program component and aspects of auditory training, such as identification and discrimination of sounds, may be included in hearing aid orientation. While most rehabilitation programs continue to provide a range of services, it is fair to say that there is a heavy reliance placed on hearing aid evaluation, selection and adjustment (McCarthy and Alpiner, 1982; Hodgson, 1986; Erber, 1988).

Many people have been well served by amplification, but there has been a recognition in recent time that alternate methods can complement
amplification centered approaches (see Schow & Nerbonne, 1989, for a brief description of a few). Examination of fitting procedures for hearing aids has shown that not all individuals benefit as well as expected from amplification, and those who do benefit could potentially receive greater results with additional rehabilitative service. Some alternative approaches, like Erber’s, have focused on communication ability (e.g. Alpiner, 1971; Fleming, 1972). Recent rehabilitative approaches with cochlear implant recipients have included not only communication strategies (Tye-Murray, 1992), but counselling with familiar communication partners and practice in the use of contextual and linguistic cues in speech perception (Gagne, 1992). These approaches are becoming less alternative and more mainstream as implant centers and manufacturers of the devices promote and publish information on such rehabilitation services.

Recent articles and texts on aural rehabilitation practices commonly include a recognition of the importance of communication training as a component of a total rehabilitation approach (McCarthy & Alpiner, 1993; Schow & Nerbonne, 1989; Sanders, 1971). The degree to which they provide actual details on clinical practices varies; for example, Sanders (1971, 1982) discusses a communication model and provides theoretical footings with some discussion of auditory training programs, while Schow & Nerbonne (1989) recognize a "traditional" approach that consists of speech reading and auditory training. Schow and Nerbonne’s discussion of auditory training relies primarily on the program of Garstecki (1981), who promotes auditory communication by variations of message redundancy and situational cues in variable noise conditions. The client learns to optimize listening conditions, to ask informative questions and to use context in message perception. The program’s goals are to improve understanding of auditory messages without
the advantage of being able to see the speaker.

The basis for some of the "alternative" approaches is a recognition that the comprehension of speech relies on both analytic and synthetic processes. Sanders' (1971) model of communication accounts for both and details an interactive model. The message is constructed in the mind of the listener, in part, by the detection and discrimination of speech sounds or words - the analytic process. The synthetic aspect recognizes that comprehension relies also on the set of cognitive resources, expectations, and experiences that assist the listener to relate meaning to sensations. Both analytic and synthetic processes operate in an interactive manner that complements and compensates for each other.

It can be argued that a narrow or exclusive focus on amplification addresses only the analytic side of comprehension, and, in addition, only the impairment aspect of the individual's rehabilitation. In such cases, rehabilitation therapy is primarily concerned with the restoration of a physical function by which the speech sound wave is perceived (Erber, 1988, see p33-34). The synthetic approach to rehabilitation stresses the client's use of the auditory signal in conjunction with an understanding of the communication process, the context of communication and his/her knowledge of language.

The methods by which the different rehabilitative approaches are delivered may also contrast if extreme ends of the spectrum are considered. The origin of aural rehabilitation and amplification (i.e. military hospitals, clinics) places it within the medical model of treatment or therapy. The scientific and medical model have advanced it along certain lines with respect to service delivery. In this model patients are often passive recipients of treatment procedures that are "done to them" for their benefit. The recent attention to a broader range of synthetic communication skills relies on the delivery of
information and encouragement of certain behaviours. An education model may be more apt in this case. Therapy in a synthetic approach may bear a close resemblance to education and benefit by adopting teaching principles.

1.3 Description of the Erber Program

Erber's program is described in *Communication Therapy for Hearing-impaired Adults* (1988). This publication presents the theoretical basis for his methods and discusses the application of theory in clinical practice. The rationale behind his approach appears in the discussion of his communication model and in the sections dealing with common communication problems caused by hearing-impairment. Chapters on “Clinical Procedures” and “Communication Practice” give examples of the clinical procedures and activities he uses, as well as stating general principles that guide the program.

The intended clients, as the title indicates, are hearing impaired adults. The reasons for this distinction are endemic to the therapeutic terrain that the program covers. This target group is made up of adults whose hearing loss occurred subsequent to normal acquisition of language. Some language skills are essential for participation in the program. The goal of the program is primarily to improve the ease and efficiency with which conversation is conducted, making ability in spoken language a requisite skill. One of the means by which the goal is pursued is by raising the client's "meta-linguistic" awareness. The acquisition of basic language skills and meta-linguistic knowledge are both developmental in nature, placing some importance on "mature" fluent language skills.

According to Erber there are several reasons why traditional aural rehabilitation is limited in its effectiveness (pp.33-34):

1. The orientation of therapy is almost exclusively towards the client's
impairment at the sensory/perceptual level. This is evident in the great reliance placed on amplification.

2. Many providers of aural rehabilitation services conform to a classroom teaching style that puts the clinician in a dominant role, rather than using a process that is more interactive, typical of conversation and readily transferable to use in the real world.

3. Very little attention is given to the interactive nature of typical communication situations, or to the role of the other conversational participant(s).

4. Rarely are the basic linguistic and/or social principles that direct conversations considered.

The net result, Erber contends, is that very few aspects of conversation are ever considered (p. 35). The consequence of this is that an important element of the client's life outside the clinic is not addressed; communication occurs in different forms, but perhaps the most immediate, in social and emotional terms, are the conversations in which we frequently engage. Conversation is the form in which language acquisition occurs and throughout life remains the most "basic" kind of language usage (Levinson, 1983; McLaughlin, 1984; Goodwin & Duranti, 1992).

Erber's attempt to circumvent the perceived shortcomings of traditional aural rehabilitation is evident in his methods. A point by point response to the list of shortcomings above gives a good outline of what Erber tries to do:

1. Erber recognizes hearing impairment to be essentially a communication disorder of "sensory/perceptual origin" (p.34). The model of hearing disability that he proposes is hierarchical, with loss of conversational fluency as one of the "down stream" consequences of the sensory deficit. Each stage of
the hierarchy can be targeted with therapy selective of that stage. There is a need, according to Erber, to address therapy to the often neglected level of conversational fluency. The appropriate therapies would be conversation-based and address clarification strategies, metacommunication, problem solving, and communication partners.

2. Erber recognizes the need to design ecologically valid clinical methods that address the client's needs in the everyday world. He describes his approach as conversation-based. He means "conversation-based" in respect to therapy content, and also in respect to therapy delivery. Therapy activities are planned to address certain aspects of communication, and an integral part of all therapy activities is to include an evaluative discussion of the activity. Conversation, with an awareness of communication problems, can be therapy itself. He points out that efforts to avoid the strict reliance on perceptual methods should include the use of conversationally based evaluation. The hallmark of his method is interactive conversation-based therapy.

3. Erber suggests that it is useful to examine the role of frequent communication partners, both as speakers and listeners. Potentially, the partner can learn to contribute to conversational fluency by better understanding of communication in general, and the problems of her/his hard-of-hearing partner, in particular. As a basic first step, this might include practice in paced, clear articulation that is easy to hear and lipread. He suggests that discussions and role playing can instill an appreciation of the communication difficulties of a hard-of-hearing person and can promote empathetic concern. It may also help the communication partner anticipate problems, and contribute to efficient clarification strategies.
One of the ways in which Erber approaches therapy with the client's "partner" is through the use of a HELOS, an electronic instrument that distorts speech (see Chapter 3 for a more complete description). The device is used to simulate a hearing loss, and can be adjusted to control for different degrees of distortion. The device can be used in a variety of conversation activities, with both the partner and clinician in the role of the "hearing-impaired" conversationalist.

4. Language research in a variety of disciplines has yielded a lot of information about the nature of conversation. The area of pragmatics, often defined as language in use, is concerned with the ways in which we use language and how we construct meaning. Erber proposes making knowledge about the structure and use of language an integral, effective component of aural rehabilitation. He proposes therapy activities that discuss contingent-pair sequences, the constraints of semantic and syntactic structures, clarification strategies and speech act theory.

1.3.1 Erber's Clinical Model of Communication

Erber's clinical communication model is constructed with the understanding that conversations are built up by turn-taking exchanges that can be initiated by either participant (p. 25). The graphic presentation of the model shows "talking-head" figures common to many communication models, but has the hearing-impaired client on the left as the initiator of conversation. Erber places the hearing-impaired person in the more prominent position to emphasize that the hard-of-hearing individual, at times, will be the one who initiates conversations, asks for information and directs
clarification requests. It is understood that the communication partner and hard-of-hearing client reverse roles in normal conversation. In this model the hard-of-hearing person is not a submissive recipient of speech or therapy, but an active participant in both kinds of exchanges.

Three other heads, besides the client, are depicted: a communication partner, an observer and a planner. The observer is not directly involved in conversation, but can guide the participants or judge overall fluency. The role
of planner is taken by the individual who has devised and organized the specific therapeutic interaction, usually the clinician. One aspect of this model that is useful in the clinical setting is that the identified roles can be played by the different individuals involved in the therapy: the clinician, the hearing-impaired client, and the communication partner can at different times assume other roles. For example, the client can observe a conversation and judge fluency, the partner or clinician can be the hard-of-hearing participant (use of the HELOS assists in assuming the role of hard-of-hearing figure). The role playing is intended to increase awareness of aspects of conversational fluency or to help the therapy communication partner become more aware of communication problems related to hearing loss.

The goal of increasing the client's and the communication partner's metacommunication awareness can be accommodated within this clinical communication model. Furthermore, Erber contends, the process is close enough to actual life situations that benefits can be immediate and direct.

1.3.2 Therapy Activities

Erber suggests that the clinician be flexible in ability to adapt the program to fit the needs of each client. Therefore no prescriptive format for therapy activities is provided; however, assessment of needs is considered on an ongoing basis and a general outline of therapy procedures is provided. Immediate goals are determined by the needs and wishes of the client within the general framework of the program. (More complete descriptions of the activities used and reported in this project can be found in Appendix 1 “Therapy Activities”.)

Erber reports that clinical experience has shown him that hearing-impaired clients typically have four things to aid them in their comprehension of
conversation. These four aids to comprehension are principle points of the client’s metacommunication awareness:

1. awareness of physical environment and situation
2. word order and word associations (i.e. syntax and semantics)
3. inter-personal and inter-relational factors
4. sequential contingencies

The program is centered around activities that attempt to improve the client’s awareness of these elements. Erber identifies reference to the clinical formats described by Hull (1976), Binnie (1976), Garstecki (1981), Sanders (1982), Bode, Tweedie, & Hull (1982), Erber (1982), and Davis & Wilcox (1985). Five main activities are used in Erber’s clinic (p.45) and involve both the client and partner:

1. Professional conversations - for program orientation, to plan individual goals.
2. Simulated conversations - playing roles in realistic environments, which are then analyzed and discussed.
3. Assessment - of the client’s perceptual and language use skills.
4. Communication practice - practice of selected deficient skills
5. Observe and Analyze - personal conversations between the client and communication partner.

The aids to comprehension, listed above, can assist the hearing impaired individual when conversational fluency breaks down. They also become important in the development of efficient clarification strategies, which is the other major component of therapy. In Erber’s estimation many hearing impaired individuals attempt to gain understanding when communicative fluency breaks down by first resorting to pragmatic strategies (p.89). These
strategies in many ways relate to “reading” the situation, assisted by:
knowledge of the topic of conversation, awareness of physical environment and
linguistic context, and guesses about what the communicative intentions of the
communication partner may be.

Therapy efforts directed to develop efficient clarification strategies cover
the following areas:

1. Consideration of influences of the individual(s) and situations that contribute to the context of a conversation.
2. Speech act theory, in that, when we talk we generally perform communicative acts with particular intentions and consequences. Conversation participants form expectations about what their partner(s) may want to communicate.
3. Contingent sequences (i.e. typically related sequences of utterances) provide some expectation about the possible form, if not content, of responses to sequence initiating utterances. This can be useful for the hearing-impaired client when he/she wishes to initiate a clarification sequence.
4. Examination of syntax and semantics in providing and predicting meaning. Incomplete comprehension of the partner’s utterance can be overcome by making logical assumptions about the missing parts.

1.3.3 Conversational Fluency

Erber states that the principal goal of his communication therapy is to improve conversational fluency. Conversational fluency is defined by Erber as the qualities that make a conversation efficient and coherent. He notes that fluent conversations have few diversions, explanations, definitions or clarifications. Erber admits a need for further research on the concept and
notes that there is not a standard methods to quantify conversational fluency (pp.187-189). In part this failing is due to the inability to precisely identify important components of the concept. The problem is not simply one of devising quantification methods but of determining what to quantify. One suggestion Erber makes is to look at “efficiency”, which can be measured as rate of exchange in turns per minute (p. 188). He suggests that other indicators of fluency may be the proportion of time that each participant talks and the proportion of time in the conversation that is actually devoted to information exchange.

Conversational fluency, presently, is a pretheoretical notion. This does not mean that the notion is of no use, Erber points out that we can still make judgements about fluent conversations; we simply have a difficult time explaining our subjective impressions.

The concept of conversational fluency is also used by Erber to outline a hierarchy of hearing disabilities (pp. 4-5). This sequence follows from: Sensory Deficit --> Perceptual Difficulties --> Loss of Conversational Fluency --> Psycho-Social Problems. The Conversational Fluency level that he incorporates refers to difficulties in interactive communication that arise from a perceptual loss.

1.4. COMMUNICATION MODEL AND CONVERSATION RESEARCH

The Erber aural rehabilitation program draws inspiration from diverse areas: parts of traditional rehabilitation practice, his own clinical experiences and the vast amount of research literature on linguistic and pragmatic aspects of communication. This section will attempt to summarize some of the research on human communication that has particular application to aural rehabilitation as it is presented by Erber.
The metacommunication approach advocated by Erber requires the framework of a model that delineates the processes of human communication. A communication model, according to Sanders (1971: p.2), provides a representation of the stages and functions by which a particular theory explains human communication. The end result of the processes and circuitry schematized in a model is, of course, human communication. The rehabilitation process accepts that the disruption of any major component of the model results in disruption of the communication process (Schow & Nerbonne, 1989). The components incorporated into any model are therefore a vital concern to the practice of aural rehabilitation.

A model of communication is, of course, more than a drawing, it is a theory. The following section will provide a composite model by examining current theories and research on human communication, with attention given to Sander's (1982) model, which integrates principles of sensory perception with aspects of linguistic and cognitive structure in attempting to explain how we are able to comprehend spoken language. Effort will be made to expand on some aspects of Sander's model that are contained within the arena of pragmatics. This includes brief looks at the concepts of context, speech act theory and contingent sequences.

1.4.1 A Communication Model

Erber refers to Sander's (1982: p. 26) model while presenting his own "typical" model, and he also introduces a second model specific to communication within the clinical rehabilitative process. Common to many models of communication devised for purposes of aural rehabilitation, including Erber's and Sanders' models, are elements representing a source or speaker, a receiver and listener, the message or signal, auditory and visual
channels of transmission, and a feedback loop for speaker self monitoring (Erber, 1988; Sanders, 1982; Schow & Nerbonne, 1998). These elements define communication, in general terms, as a process that involves the cognitive formulation and expression of ideas, the transmission of the information in the physical environment, message reception and "decoding" by the hearer. The content of the information and factors that affect encoding and decoding lie outside the representative abilities of such models. In effect, these models have been devised to display the biological and physiological element of communication. They are inadequate in depicting what it means to hear in the real world (Noble, 1983) because they fail to address components of communication that relate to situational, contextual or social factors.

The alignment of aural rehabilitation on a new axis, as is the case with Erber's turn to conversational based therapy, requires a corresponding shift in traditional models of communication. We can observe Erber's response to this requirement in the model of clinical communication that he presents. The details of this model are discussed in the section describing Erber's program, and will not be revisited here other than to note that the model incorporates the interactive contributions of participants and situations. This model is descriptive of the situation within the context of clinical therapy. Other models may be better able to capture aspects of conversation in other contexts. The essential feature is the attempt to incorporate interactive and contextual factors into the model, which recognizes that talk is intrinsically interactive and embedded within the context of participant activity (Goodwin & Goodwin, 1992; Goodwin & Duranti, 1992).

A model of communication that focuses on conversation and thereby accepts a conversational level of disability will have some unique components that define conversation as a special genre of communication. Efforts to
understand the nature of conversation have been conducted by means of conversation analysis and investigation in the field of pragmatics. The discipline of pragmatics is concerned with the relationship between language and its user. It looks at the ways language is used to communicate information, the organization of spoken exchanges, and the roles played by context, personal attitude and background knowledge -- all of which structure conversation. Pragmatic inquiry has concentrated primarily on conversation as the most central or basic form of language use, and has found that conversation is ordered around basic pragmatic principles (Levinson, 1983:p. 284-285).

Sanders’s (1982) model is based on two key points: speech comprehension as a perceptual process, and redundancy factors in information transmission. Let us examine these in turn.

According to Erber hearing impairment is a communication disorder of sensory/perceptual origin. Examination of Sanders’s model provides a description of the perceptual process based on Solly and Murphy (1960), shown below. The first component of this model is “expectancy,” which represents our ability to anticipate or predict a given stimulus in a given situation. This component feeds into “attending” and then, finally, into “reception” in the model. Sanders writes that “it is the effect of the situational and contextual constraints placed upon a speaker that permit (sic) the listener to develop expectancy”, and the importance of this ability increases for an individual with hearing loss, who receives messages under “adverse conditions” (1971: pp.89-90).

23
In Sanders's model the gestalt principles of figure-ground perception and closure come into play in the creation of expectancy. "Figure-ground" refers to the ability of the mind to identify or make a particular item stand out against the backdrop of the rest of the world. "Closure" refers to the tendency to perceive incomplete or partial patterns as being complete. These principles enter into our perception of sensory events, including speech: we identify essential speech elements against the background noise of various sounds, and we learn the systems of language, which helps us to recognize patterns and to create meaning without having to understand absolutely every sound or word said. As hearing is a sensory process, Sanders contends that these principles are important considerations for aural rehabilitation. Rehabilitation can help people develop an awareness of important elements of communication and of the systems of language and use the knowledge to assist understanding when speech sounds are diminished or distorted by hearing loss.
A metacommunication approach to rehabilitation can emphasize pragmatic aspects of conversation, such as awareness of situation and context, and thereby prime the expectancy component of perception. Conversational awareness, awareness of syntactic and semantic structures can also be useful to clients by providing them with an organizational pattern of language which presumably will assist in figure-ground perception and closure. To put this in a simple way - it is easier to hear something that you are prepared or expect to hear than something that is totally a surprise.

1.4.2 Redundancy

Sanders's model (1971, p. 23) is of a genre that closely resembles the diagrams and discussions of electrical circuitry and principles of physics. The language used by Sanders, and others, in describing communication also reflects this predilection; terms like circuits, signal transmission, information, channel, transmitter and receiver are commonly used by them and others charting similar forms. This way of examining communication has precedence, in part, in the work of C.E. Shannon and W. Weaver, two mathematicians who examined communication systems such as telephone, television and radar. They began publishing in 1948 (as cited in Sanders, 1971) and developed a theory of communication that pointed out that the amount of information conveyed by a symbol (including language) is relative to its predictability. Predictability is dependent on the range of options, or expectations, about what a particular symbol can or may be. The work of Shannon and Weaver has been seminal and their approach is a basic concept in the understanding of redundancy, as described by Sanders.

Redundancy in language, as it is used by Sanders, is defined as the part of a message that can be eliminated without significant loss of information.
Alternately, Carroll (1964, cited in Sanders 1971: p. 31) describes it as the property of texts that makes it possible to predict the missing symbol from its context. The application of this aspect of communication to a model of conversation is obvious for individuals whose hearing gives them only partial message reception.

The speaker of a message conveys her "information" according to the rules that govern the language. The rules, known by native speakers, include the phonology, morphology and syntax of that language. These rules govern the selection and combination of different linguistic components (sounds to make words, words to make utterances, utterances to make conversations) and act as "structural constraints." Immediately after selecting the initial unit certain constraints limit the next and all subsequent combinations. The selections are more restricted with the addition of each unit. Thus predictability is increased.

Knowledge of language rules does not assure understanding of every message. We certainly are not able to guess every message from the first few sounds or words. Sanders identifies contextual and situational constraints in addition to linguistic constraints. Contextual restraints are present in the surrounding talk; for example, topic of conversation provides a contextual reference frame in which certain vocabulary is useful or even expected. Many words used in a conversation about billiards will be different than those used in a conversation about marching bands.

In Sanders's model the perceptual system supports bottom-up, or analytic construction of a message. This analytic process interacts, however, with top-down cognitive processes that assist at the level of perception by priming our attention and expectancy, as well as with our use of redundancies to assume logical positions on the information content of a message.
One aspect of top-down processing that Sanders does not cover is contained in theories of the cognitive organization of experience, in the form of schema, script and scene. Essentially these theories hold that world experience allows us to form prototypical representations of situations and concepts (Mandler, 1984). These representations permit us to organize our experiences in a referential frame; schemata refer to more general understandings of how the world works, and scripts are more aligned with familiar situations, such as our understanding of the scene and events that constitute going to a restaurant. These concepts provide an explanation of our ability to use situation and context to understand language.

1.4.3 Context

Context has become a central concept in attempts to explain how we are able to comprehend what is said. Participants in conversation “do not approach a strip of talk as an isolated object, but instead interpret whatever is being said by tying it to the context within which it occurs.” (Goodwin & Duranti, 1992: p. 191). Meaning is not derived by a simple literal interpretation of an utterance; the same words may convey different meaning at different times. For example, the phrase “I’m sorry” functions as a refusal of the request, “Could I please have a bite of your fried spam sandwich?”; the same utterance is an expression of remorse when someone says to us in the lunch room “You just sat on my lunch.” The meanings are divergent; the utterances are identical.

The precise definition of context is a matter of debate and a question that may continue to evade precise, technical description (Goodwin & Duranti, 1992). It is commonly accepted that there are two types of context: an “external or distal” type and another “discourse or proximate” type (Schegloff,
The former can be characterized as elements present in the environment or situation in which a conversation takes place. This includes not only physical objects or location but also relevant aspects of social life, such as gender, ethnic membership, class-position-prestige or other elements that convey power in the social realm. In other words it includes things that are external to the dialogue. The discourse types of context are those elements that guide conversational contributions according to discourse structures (such as those that regulate well formed story formation, greeting sequences, request-response sequences, etc. and the roles played by the conversationalists as participants in these sequences).

Another method of defining context includes the recognition of static and dynamic components of context that surround and feed into an hypothesized language processor (i.e. a language component of cognition) which controls language use and comprehension. The dynamic context is related to conversation events and structure, while the static component consists of extralinguistic, paralinguistic and linguistic contexts (Davis, 1989).

Among the static components, extralinguistic contexts are considered to be within the domain of pragmatics; within this pragmatic element there are external and internal contexts. The external includes the physical setting, speakers and communicative movements of others. The internal contexts include the system of values and beliefs of the participants, their world knowledge and their social status. Davis identifies the paralinguistic context as the prosodic component of speech (however, many linguists consider prosody to be linguistic, not paralinguistic) and the linguistic context as structures that maintain coherence in discourse - structures of coherence such as the microstructure and macrostructure proposed by van Dijk & Kintsch (1978).
Finally, the dynamic context of conversation deals with the structural characteristics of conversation. This includes the set of assumptions individuals have about conversation, such as our implicit agreement to take turns speaking, and our assumption that we co-operate in conversation by making our contributions relevant, informative, truthful and expressive (Grice, 1975).

The two definitions above differ more in their taxonomy than, perhaps, what they consider to be language context. A bewildered observer might comment that just about every thing is context. Such bewilderment has been addressed by Schegloff (1992) in what he terms the “paradox of proximateness.” Schegloff argues that conversation analysts may, in degrees of finer and finer analysis, determine that almost anything is relevant to external context. The imperative for researchers is to illustrate in some way that a particular element is relevant to the conversation. For example, the setting of a conversation may be deemed to be relevant to conversational exchanges. A conversation in a doctor’s office may rely on the context of doctor-patient roles, reference to medical terminology etc. Schegloff asks why we should not consider more specific situational context, and what determines the limits. The office may be on the third floor, the window faces west, the walls are painted with a dusty rose latex. Can this information be considered context? Well, if the setting sun were to shine through the window and temporarily blind the speaker, and she comments on it, then of course the west facing window is an item of context. Schegloff’s point is that context cannot arbitrarily be determined a priori; some evidence must be present in the behaviour of the participants for an entity to be elevated from background to figure and become context. Back to the point of the paradox -- if the internal state or attention of the participants must “activate” an awareness of a external context?
contextual entity and thus make it relevant to the conversation, then the external and internal formulation of context is a moot point. An item becomes context when its recognition by the conversationalists makes it significant. On the other hand, others would still argue that the focal event cannot be properly understood without resort to larger assumptions relevant to the organization of the exchange; for example, culture, social setting or shared world knowledge, which may not be readily observable in participant behaviour. (Gumperz, 1992).

A response to problems of definition can be found in notions of context as a frame, surrounding an event, which provides resources for interpretation (Goodwin & Duranti, 1992). Context then involves a focal event and a “field of action” in which the event is embedded. Goodwin & Goodwin (1992) argue from their data that participants in conversation identify relevant context by actively constructing context “through intricate collaborative articulation of the events they are engaged in” (p. 149). The interactive nature of conversation thus extends to the mutual construction of contextual entities.

While reading the research and definitional discussion of context one may rightly wonder what the implications are for aural rehabilitation and communication therapy. In reference to Erber’s notion of conversational fluency we may theorize about research showing collaborative construction of context. One may assume that a hearing-impaired individual is at a disadvantage in this “intricate” negotiation. If this is so, then does loss of conversational fluency bear any relationship to a reduced “field of action” or problems associated with identification of a focal event. Perhaps the act of collaboration itself provides a component of social satisfaction. We know that feelings of isolation and social withdrawal can be associated with hearing loss. Shared perceptions of a situation shape the interactions of those involved in

Context in therapy is approached in Erber's program through discussions and role playing aimed at increasing the client's and partner's awareness of the contributions of context. The issue is not easily or completely resolved, but simple measures such as identification of topic can create a frame of reference that may activate shared contextual backgrounds between familiar persons.

1.4.4 Contingent Sequences and Turn Taking

The interactive nature of conversation is readily observable in the way speakers manage turn-taking. The alternation of speaker and listener roles is one of the fundamental characteristics of conversation that distinguishes it from other forms of discourse. Researchers generally agree that a conversation is distinct also by virtue of the facts that: the exchange of roles is nonautomatic (i.e. it is regulated by certain participant directed principles); neither the size nor the order of turns is predetermined; and, theoretically, the apportionment of turns is equally divided (McLaughlin, 1984). There are indications, however, that some of the defining characteristics of the turn may vary according to culture or language, and that the management of turn taking is grounded in cultural context (McLaughlin, 1984). At any rate, it is accepted that conversation moves forward by the alternating contributions of those involved, and that this turn-taking arrangement is a linguistic universal.

Sacks, Schegloff and Jefferson (1974) suggest that the system by which turns are regulated is locally managed; it operates on a turn by turn basis and manages just the transition from one speaker to the next. An important feature of the system is that it organizes prototypical turn sequences, sometimes called adjacency pairs or contingent sequences. These paired utterances are of the greeting-greeting, offer-acceptance, question-answer,
etc., type. Schegloff and Sacks (1973 - as reviewed in Levinson, 1983) characterized the adjacency pairs as: adjacent in conversation; ordered as a first and second part; and typed so that a first part generally accepts a second from among a possible range of options (e.g. offer/acceptance or refusal). It has become apparent to researchers that strict adjacency is too strong a condition (Levinson, 1983, Schegloff 1991); other sequences of conversation can fit in between the first and second part of the pair, as in the case of insertion sequences that make clarification requests or establish conditional relevance (i.e. establish conditions that relate to the relevance and acceptability of the second part; see Levinson p. 306 for a more thorough explanation).

Another of Sacks and Schegloff's adjacency pair characteristics that has been critically examined is their contention about a range of possible second part choices in the pair. Choices are possible, but it is believed that they are ordered in terms of preferred or dispreferred choices; they are ranked according to social and conversational convention (Levinson, 1983; McLaughlin, 1984). Levinson compares the concept to that of markedness in linguistic theory. Preferred seconds are unmarked while the dispreferred are marked by "various kinds of structural complexity" (McLaughlin, 1984: p. 307). For example, in the request/compliance-denial pair, compliance with a request is unmarked and usually immediate. The denial of a request is usually marked by a pause and often preceded by a disclaimer such as "Well ..." or "I'd like to help, but..."(McLaughlin, 1984).

Certain situations, such as greetings and good-byes, have prototypical sequences that perform social or discourse directed tasks. One type of sequence that was important for purposes of this study is the repair sequence. Repair sequences may be of different types, which differ in form,
and/or serve to clarify or correct different types of conversational breakdown (Garvey, 1977; McLaughlin, 1984; Brinton et al., 1984; Cassie & Rockwell, 1992).

The type of repair that is most germane to aural rehabilitation is, of course, to clarify misunderstandings that result from something not being heard clearly. “Sequence” is more proper as a descriptive term for these events than is adjacency pairs, since they are definable over three or more turns (Garvey, 1977). Garvey’s research has given basic structure to what she termed the contingent query; they are contingent in that they are embedded within, and subordinate to, the main sequences of conversation. They function as a request for information, requesting a verbal response to the query. The minimal form, according to Garvey, is a three-step sequence (1977: p. 69), consisting of an utterance, a contingent query and the reply to the query. Garvey attributes two properties to the query component: a selectivity function and a determining function. With respect to the content of the initiating utterance, the selectivity function may be specific, nonspecific or potential; i.e. it may make specific reference to the content of the utterance (e.g. “Did you say x”), or it may be nonspecific (e.g. Huh?, What?), or potential in the sense that it identifies elements that elaborate or are potentially useful in clarification. The determining function recognizes that the query proper can request a certain form of response, i.e. it can determine the particular type of response. Garvey identifies repetition, confirmation, specification and elaboration as possible determining functions.

It is obvious that the amount of a message that is understood will directly effect how specific a person can be in requesting clarification; what is heard may vary from the detection of sound/speech to perception of all but one or two key words of the utterance. The range of selectivity and determining
function may thus be limited. Very little information is available on the overall effect on communication when these aspects of contingent queries are restricted by hearing loss. One may assume that the effects extend beyond the immediate concern of “message transmission” to include aspects of discourse regulation and social comment that contingent queries also perform.

In an aural rehabilitation program, such as Erber’s, that stresses metacommunication, awareness of the sequential structures of conversation can be useful for a hearing impaired client. In some instances the form, if not the content, of a response can be determined by sensitivity to the adjacent pair choices and features of markedness. Clarification sequences initiated by a hearing-impaired individual can also use the determining function of the request to “shape” the most efficient type of response (for example Erber’s ASQUE exercise gives practice in forming yes/no, choice and content questions).

Certain questions arise in relation to Erber’s concept of conversational fluency. Clarification sequences are assumed to be features of dysfluency, yet they also occur in normal fluent conversations. One might want to ask if perceptions of dysfluency are (1) related to the frequency with which queries occur, (2) whether perceptions are possibly related to the proportion of turns devoted to clarification, and if they become more prominent in conversations when more turns than three are required for resolution? As conversational fluency seems to be a subjective perception at present, these questions can not be answered without investigation that further defines the concept.

1.4.5 Speech Act Theory

One way of looking at communication is to consider how people do things with language. J.L. Austin approached the issue from this angle and
presented his theories in “How to Do Things With Words” (1962). Austin was interested in the manner in which people put language to use to accomplish social goals. Speech act theory, which is the derivative of his work, has been developed by philosophers and linguists. A speech act is generally understood to be the social action performed by a speaker within the context of the utterance (van Dijk & Kintsch, 1983), and occurs when a speaker makes an utterance in an appropriate context with an underlying intent (Searle & Vanderveken, 1985). These social actions are the promises, statements, questions, etc. that we encounter in conversations.

Within this theory the minimal unit of human communication is called an illocutionary act, which is composed of an illocutionary force and a propositional content. In short, the illocutionary force identifies the intended action of the utterance and is realized in the syntax of language construction (by the indicate mood, question form etc). The propositional content of the utterance is the semantic arguments expressed by the contents of the utterance, or it is often identified simply as the predicate and its arguments (Brown & Yule, 1983). Speech act theory attempts to characterize the logical form of the illocutionary act “independently of the various forms of expression that may exist in actual natural languages” (Searle & Vanderveken, 1985; p.2).

When making a meaningful utterance in an appropriate context, the speaker performs an illocutionary act. The illocutionary force of a speech act can be classified as either: assertive, directive, declarative, commissive, or expressive (Searle & Vanderveken, 1985). With assertives we comment about “how thing are in the world” - we insist, state, suggest things; directives are used to get the hearer to do an act of some sort; declaratives usually rely on a context of formality and authority and attempt to bring about a change is the world by declaration; commissives commit the speaker to a future course of
action, such as obligation by a promise; and expressives are used by the speaker to express personal attitudes or emotional/psychological feelings.

The illocutionary force of an utterance is independent of the words by which it may be expressed. For example, someone may look over at a window you have recently opened and comment “It’s kind of cool in here”. The force of the utterance is that of a directive - you are being asked in an indirect way to close the window. On the surface the utterance is an expression of personal opinion, but within the context of the utterance the illocutionary force is something quite different.

Comprehension of spoken language requires an understanding of the social acts that underlie an utterance and the contextual elements that contribute to meaning. Both the hard-of-hearing client and the therapy partner in Erber’s program are made aware of these conversational components (again by discussion, role playing & therapy activity), with the assumption that a heightened awareness can assist in the formulation of clearer messages and better comprehension.

1.5 HYPOTHESES

The literature shows that conversational communication relies not only on the analytic “bottom-up” perception of speech, but also on social, linguistic, pragmatic, and cognitive expectations that envelope the participants and shape the conversation. Aural rehabilitation, as a form of communication therapy, has long focused on the perceptual aspect of speech comprehension -- that is, it has come to depend predominantly on amplification as a compensatory measure – while neglecting other facets of communication that influence how we interact both socially and linguistically. Erber proposes that aural rehabilitation should undergo a widening of focus to incorporate
linguistic and pragmatic principles that address the communication problems experienced by hard-of-hearing persons in conversations. By involving a communication partner in therapy with the client, Erber contends that conversations between the two can become more interactively efficient and fluent. Thus the client can benefit in an immediate and socially significant way.

This research is based on methods that identify and quantify communication behaviours. The evaluation of program effectiveness relies on a model that identifies subject benefit and process efficacy as discrete components of evaluation, and which recognizes that benefit may be experienced by the subject in the areas of impairment, disability and/or handicap.

If, as evidence indicates, the following assumptions are correct:

1. persons with hearing loss can use metalinguistic and metaconversation knowledge, as presented in Erber’s program, to help themselves understand more of conversations and thereby experience more efficient and fluent conversations;
2. therapy provided to a client’s communication partner gives that person an improved understanding of hearing loss and gives resources to make conversations more easily understood and fluent;
3. the ability to communicate in conversation exchanges can be assessed with objective and subjective clinical measures to provide an accurate indication of “real-world” conversations;

then, the following hypothesis can be put forth:

1. This therapy approach will be of benefit to a client by improving his
ability to understand conversations better and thereby to be a more efficient and fluent communicator. Benefit will be observable in the following areas:

a. increases in the amount of conversation understood;
b. increases in the efficiency of communication, where efficiency is taken to be the rate at which information is conveyed;
c. improved fluency of conversations, where fluency is taken to be an impression based on the coherence and efficiency of conversation;
d. improvement in the ability to repair conversational dysfluencies;
e. satisfaction with the ability to have conversations and to use the strategies trained in the therapy in different situations and contexts.

2. As a result of therapy, a communication partner should exhibit an increased awareness of the communication difficulties experienced by a hard-of-hearing individual and become more efficient in relaying information to a person in conversation. She should be satisfied that their conversations together are more fluent and efficient. Changes should be observable in the following measures:

a. improvement in performance on efficiency related measures;
b. improvement in the ability to effect conversational repairs;
c. satisfaction on subjective measures that gauge benefit from therapy.

3. Changes in conversation related to therapy can be measured. A study that measures changes in a series of evaluations at regular intervals of time will indicate if benefits are related directly to the number of therapy hours and, in particular, if eight hours of therapy provides significantly more benefit than four hours.
4. The evaluation measures that are available for use in the study of communication provide a composite assessment of conversation ability. Both objective and subjective measures will indicate benefit if it occurs. Critical examination of the various evaluation methods should indicate the proper application for each method when used in the evaluation of conversation-based communication.
CHAPTER 2
METHODS

This chapter presents the method by which the hypotheses were tested. The initial step was to prepare a therapy program based on Erber's principles, then to deliver the program and collect data with which to evaluate the benefits (if any). A hard-of-hearing subject and a communication partner were recruited to participate. They are identified hereafter as S (subject) and CP (communication partner). A graduate student employed by the School of Audiology and Speech Sciences at UBC assisted in the evaluation; she is identified as D (evaluator).

Sections of this chapter describe the research design, the subject and communication partner, therapy procedures and materials, and the evaluation procedures used. The evaluation procedures are identified in separate sections as objective and subjective measures. The objective measures include TOPICON and tracking and the subjective measures used are the self-report Hearing Performance Inventory questionnaire (HPI) and a final interview with S, CP and their parents.

2.1 RESEARCH DESIGN

This research was devised as a single subject study with a time series design. The time series design incorporates a baseline period prior to therapy where dependent variables are sampled. Equal time intervals mark off periods during the course of therapy when the evaluative measures are again taken. This design has been widely used in psychological studies and also in efficacy studies examining aphasia treatment (Howard & Hatfield, 1987; Warren, 1986). The time series method is generally considered suitable where the anticipated results are of a global nature and not amenable to item-specific evaluations. The design was used in this study to assess conversation skills over an eight week period.

In this study evaluation sessions were scheduled at two week intervals. Two
evaluations were conducted before therapy, one during therapy and two after completion of therapy. The baseline was measured in the first and second evaluations. Evaluation three occurred at mid-point between therapy block 1 and therapy block 2. Evaluation four was conducted upon completion of therapy and then evaluation five was scheduled for two weeks after the conclusion of therapy.

In order to make an evaluation of benefits associated with four versus eight hours of therapy, two features of study design were necessary: first, the midpoint evaluation was scheduled to coincide with four hours of therapy, and secondly, the presentation of therapy materials was arranged so that the vital components of the program were all covered in the first block of therapy. Review and refinement of therapy activities took place in the second block. The second block was used to go over some of the same components of therapy in different ways or in greater depth, and also to accommodate the participants by reviewing things they found helpful.

**Figure 2.1: Evaluation and Therapy Schedule**

![Evaluation and Therapy Schedule Diagram]

---

41
2.2 SUBJECT AND COMMUNICATION PARTNER

2.2.1 Subject

The subject (S) who participated in this study was a 19-year-old male. His hearing loss was identified at the age of 14 months. The etiology of his sensorineural loss is unknown, but it is thought to be congenital in nature. Family reports indicate that within a month of identification of the hearing loss he was fitted binaurally with hearing aids. He then began receiving speech-language instruction twice a week at the Witwatersrand University Speech and Hearing Clinic in Johannesburg, South Africa. Instruction was auditory-oral in method, and after being seen there for two years he had progressed to where he was saying his first words.

The family then moved to Vancouver, where S was enrolled at the Vancouver Oral Centre. This school is committed to an oral communication mode, and as such provided some continuity in the method of speech-language intervention S received. At 10 years of age S was fully integrated into grade four in a regular classroom. An itinerant teacher from the Vancouver Oral Centre continued to assist S until he reached grade 10. During the final two years of high school a learning assistance teacher worked individually with S three times a week to provide him with academic assistance. S did well in school and was a hard working student who made the honor roll annually until grade 10. When this study began, S was enrolled in an Adult Basic Education program, where he was picking up classes in high school mathematics and chemistry, with an expressed goal of furthering his education at the post-secondary level.

The degree of hearing loss experienced by S has been unchanged for as long as family records serve to indicate. A recent audiogram indicated a sloping severe-to-profound loss bilaterally. Aided thresholds tested in the sound field with warble tones were in the mild -moderate range from 250 to 2000 Hz (see Appendix 2 for re-creation of audiogram). These results were reported to be stable by S's audiologist
in so far as they were similar to previous findings. During this study, S used a pair of Unitron EIP hearing aids that he had had for seven years and with which he was comfortable and reasonably satisfied.

The special language instruction provided for S has been, from all reports, predominantly oral-aural (some sources may refer to this by different names such as "Auditory Verbal-Oral" or "Oral", for example). In addition speech reading is an important component of his communication abilities. He and his family estimate that in various situations he relies on speech-reading for approximately 40-60% of the information he understands. Results from formal testing suggest that, in fact, he may depend on speech reading to an even greater extent (See sections 2.2.2 and 2.2.3 on the speech reception threshold and speech perception in noise tests).

A consideration in recruiting a subject and a communication partner for this study was that they should be fluent speakers of English. The reasons for this are intrinsic to this therapy approach, which relies on an awareness of the redundancies of the English language to create communicative strategies. The literature on hearing loss and acquisition of language indicates that without early intervention the development of language skills may suffer, and that even with intervention, varying levels of success are realized. Furthermore, development of communication skills, including semantic and pragmatic skills, does not necessarily correlate with degree of hearing loss (Curtis, Prutting & Lowell, 1979). Therefore it was necessary to determine the level of proficiency in English for potential participants.

An interview and history were the methods chosen to establish suitability for participation. Of particular interest was the potential subject's language skills, as demonstrated in oral, written and reading abilities. S's speech was intelligible and easily understood by his family. Those unfamiliar with S would notice that he sounded somewhat different from most people, but that he was nonetheless easily understood. Judgements of S's reading and writing skills were solicited from him
and his family. They reported that he enjoys reading as a recreational activity and that he had completed his grade 12 English with a C grade. Although English classes were not his strong suit, reports show that he demonstrated a level of language skills that served him successfully through his school years, and enabled him to graduate from high school. This was considered to be adequate for the purposes of the present study.

A consideration before beginning evaluation procedures with S was to determine at what signal to noise ratio (S:N) the evaluation materials should be presented. Reports from his family indicated that face to face conversations in quiet conditions did not pose serious problems for them, but situations where there was noise were more problematic. As a result it was decided that an assessment would be conducted to determine a S:N that created communication problems for S, without forcing him to rely entirely on lip reading.

The determination of an appropriate S:N followed a series of steps:

1. estimate speech reception threshold in multi-talker babble (Cheesman, 1992);
2. test Speech Perception In Noise (SPIN) Bilger, Nuetzel, Rabinowitz & Rzeczkowski, 1984;
3. use the information from these two tests to determine a S:N at which the subject experienced a moderate amount of difficulty.

The tests were conducted in the soundfield with S using his hearing aids. The components of the process are described in greater detail below and contribute to a complete description of S and his hearing ability.

2.2.1.1 Speech Reception Threshold in Multi-talker Babble

The procedure followed that outlined by Cheesman (1992). This test uses a set of six spondees that had been found to show equal probability of identification in speech reception tests in noise under a range of S:N conditions. These test words are
airplane, birthday, hardware, northwest, playground and whitewash. An audio tape of these spondees was played through one of the channels of the audiometer while 8-talker babble at 65dB HL was played on the other channel. In this protocol speech reception threshold is defined as the minimum level at which 50% of the spondees are identified correctly. A descending bracketing procedure is used to determine the threshold for the spondee reception, while the level of the 8-talker babble is held constant. The results are presented after the following description of the SPIN test.

2.2.1.2 Speech Perception in Noise (SPIN test)

The SPIN test described by Kalikow, Stevens and Elliot (1977) consists of a list of 50 recorded sentences and aligned 8-talker babble. The speech and babble are presented on separate channels in order that the presentation levels of each can be controlled independently. The task of the listener is to repeat the final word in each sentence. The final word is always a noun that is either highly predictable from context or a noun that does not have contextual predictability. The 50 sentences in each list consist of 25 predictable and 25 neutral sentences (e.g. predictable: Stir your coffee with a spoon; & neutral: The old man talked about the lungs). Bilger et al. (1984) in their evaluation of the materials and procedure, point out that performance indicates levels of skill in two disparate areas: ability to listen in noise and ability to use context to deduce meaning.

Bilger et al. (1984) standardized the procedure for presentation of the speech at 50dB SL with a +8dB S:N. The initial step is to determine the listener's threshold for the babble; this is the lowest level at which the listener is able to detect the presence of the babble. The speech signal is then presented at 50dB above the estimated threshold, and the babble at 8 dB below this level. The revised list of sentences prepared by Bilger et al. was used in the present study.
2.2.1.3 Test Results

S was unable to correctly identify any of the spondees in the test of speech reception in multi-talker babble. Various levels of presentation were tried. The test was stopped when the intensity approached a level that he found uncomfortable. The SPIN test produced similar results. S was able to detect the presence of the babble at 25dB HL, but was unable to complete any sentences at the following levels of speech to noise: 75:67, 75:30, 65:45 or 65:quiet.

S was able to converse in the sound booth in quiet conditions if he could see the speaker when speech was presented at 65 dB HL. For this reason it was initially decided to conduct evaluation procedures under these conditions (i.e. 65:quiet). This presentation level was used in all objective evaluation measures with S and D, but some tracking procedures with S and CP from Evaluation 2 to 5 were done at 65:40 in order to increase the difficulty of the task (See section 2.4 Evaluation Procedures for further description of evaluation procedures and for reasons why the change in presentation level was made). This information serves to indicate the extent to which S relies on speech reading and other visual information to understand conversation.

2.2.2 Communication Partner

CP, the 17 year old sister of S, participated in the study as S's communication partner in therapy. She, along with other family members, have no identified hearing loss or communication problems. CP was in the process of completing grade 12 and, while she had considerable knowledge of hearing loss that she gained through familial experience, she had received no formal instruction on ways to communicate with hearing-impaired persons. A high level of support and interest in the program, and in the welfare of S, was expressed by the entire family.
2.3 THERAPY PROCEDURES and MATERIALS

2.3.1 Organization of Therapy Sessions and Materials

S and CP came to the UBC campus for all therapy sessions. Regular meeting times were scheduled to accommodate research design and the convenience of S and CP. The only change to the agenda occurred at the first therapy session when CP was unable to attend and her mother came instead. This resulted in CP receiving only seven hours of therapy in total, but it was felt that the unavailability of CP that day did not warrant putting the entire schedule in disarray and that broader family involvement might be beneficial.

Therapy was divided into two blocks for purposes of program evaluation. A block of therapy consisted of four sessions, during which the subject and communication partner were scheduled for four hours of therapy. In total S received eight hours of therapy and CP seven hours (as she missed one session) over the entire program.

Sessions were scheduled for two hours duration; typically S was seen for the first hour, and CP for the second. There was, on occasion, some overlap of time if that session included an activity that involved both participants. Planned conversation activities were conducted, but a portion of each session was open to discussion of any aspect of communication that either S or CP wished to talk about.

Typically S and CP were given printed material that outlined the rationale for a session. Also, some written home assignments were completed over the course of the therapy. The written component was incorporated into the project for several reasons. First, since conversation was sometimes difficult for S to understand, written material was an efficient way to impart some important information. The handouts were also a permanent record for the participants to review, and the rest of the family could also read them to keep abreast of the content of therapy sessions.

Therapy activities were determined by reference to the program Erber (1988)
describes and through identification of needs and goals by S and CP. Most of the activities used in therapy were drawn from those suggested by Erber (pp. 133-137) or were derived from them. Among these activities were Con-sequence, Con-tingent, Con-descending. A brief description of these activities here provides a sample of what was done in therapy, but see Appendix 1 for a more complete description of therapy activities. Many of the same activities were done with both S and CP.

The goal of Con-sequence is to demonstrate that there are various types of questions and assertive statements, and that typical responses to them vary in their predictability. For example, the response to a yes/no type question may be easier to understand than the response to a general statement because in the former case there is usually only one of two responses, while in the latter a great variety of responses are possible. In the activity the client reads a sentence from a series of yes/no questions, dual choice questions, specific information questions and statements. The clinician responds appropriately and then the client repeats to verify perception. Discussion ensues about the form of and response to the sentences and about the use of clarification strategies when the response is not correctly understood.

The Con-tingent activity uses the same type of sentences printed on file cards. The client and clinician take turns reading the cards and responding to them. After the exchange, each card is placed onto a stack which identify the sentence as either “Difficult” or “Easy”. Later discussion identifies what makes the sentences difficult or easy for the client.

The Con-descending activity is intended to make the client more aware that the degree of difficulty in understanding another communicator's response may be related to the type of question or statement that initiates the exchange. A topic is presented to the client who then makes a general statement about the topic. This is followed by a general questions, a specific question, a choice question and a yes/no
question. The clinician responds to each in turn and discussion centers around the relative difficulty of verbal exchanges with each of the five contingent pair sequences.

The accommodation of goals identified in consultation with a client is integral to many therapeutic programs and is a practice recognized and endorsed by Erber. Two areas that were eventually incorporated into the therapy sessions through consultation with the family were group conversations and how to manage changes in topic. These two concerns intersect in many situations due to the nature of informal conversation, where group interaction may lead to rapid, unannounced and frequent topic change. The inclusion of these items did not diminish the attention given to other program objectives, but provided an expanded context in which to apply the principles on which the program is based.

An additional concern, expressed by S's mother, was what she perceived to be a low level of assertiveness on the part of S — in that he was content to let many things pass by in conversation without understanding them. "Assertiveness training" was not a direct part of the therapy, however conversation and interaction styles were discussed in general terms at one session.

A supervising audiologist from the School of Audiology and Speech Sciences at UBC attended all therapy sessions. She offered program guidance and occasionally participated in conversation activities. Therapy sessions were, by and large, conducted in a relaxed setting with the opportunity for socially motivated conversations, as well as therapy related activities.

2.3.2 HELOS

The HELOS is an electronic hearing loss simulator which modifies the speech signal fed into it in order to simulate a range of hearing losses. CP was provided with the opportunity to experience a simulated hearing loss, with the purpose of allowing her
to hear speech as it might be perceived by a hard-of-hearing person.

The device alters a speech signal in two important ways. A “threshold” setting adjusts the intensity level by varying the amount of weak energy that is passed through the circuit. A “distortion” setting adjusts distortion created by introducing random phase that become progressively greater as the input frequency increases (Gagne and Erber, 1987; Erber 1988, pp. 152-155). Another feature of the instrument allows simulation of a profound hearing loss through extraction of all high frequency energy, thereby producing a buzzing sound that correspond to the pattern of bursts of speech energy.

The HELOS was set up in a sound booth, with the distorted signal being presented over the loudspeaker of an audiometer. The input came from a microphone on the client-side of the booth. Users of the HELOS were able to see each other through a window. When used during therapy, the settings were adjusted so that CP experienced difficulty in understanding a significant part of the speech signal. Therapy activities and tracking were done over the HELOS with CP, to allow her some idea of the nature of communication problems caused by hearing loss. Conversations using the HELOS were conducted with the clinician/investigator as the partner. Discussion of the communication problems created by the degraded signal was part of the therapy. Both general and specific ramifications of hearing loss were discussed, along with possible ways to improve message clarity or effect clarification.

2.4 EVALUATION PROCEDURES

The objective of this rehabilitation program was to bring about an improvement in the subject’s ability to engage in fluent conversations. Erber hypothesizes that a key dimension of conversational fluency is the efficiency with which conversation is conducted. Efficiency, he postulates, is constructed on conversational footings comprised of:
1. the turn-per-minute rate
2. the proportion of time each speaker talks
3. the proportion of the conversation devoted to information exchange

According to Erber these factors contribute to the overall rate of exchange of information in the conversation, and are readily quantifiable (pp. 188-189). It is not readily evident in what proportion these factors contribute to fluent conversations, or what other factors are also necessary. Conversational fluency may have to be accepted (or rejected) as a pretheoretical notion until more research can specify its nature. For purposes of this study it is accepted as a condition that manifests when efficient and pragmatically appropriate conversation transpires. The Tracking Procedure (DeFilippo and Scott, 1978) and a conversational TOPICON activity (Erber, 1988, p. 74) were two measures used in this study to make assessments of efficient and fluent conversation. Other evaluative measures were in the form of the Hearing Performance Inventory (HPI), and a final questionnaire and interview with S, CP and their parents.

The evaluative measures are of two types: objective and subjective measures. The TOPICON and tracking procedures are objective measures in which data is collected in conversation related activities. The subjective measures rely on self-report for assessment information. In this study the HPI and final interview were used to collect subjective information. Both types of measures were used to collect data by which the conversations of S could be assessed with respect to program derived benefits. A critique of evaluation measures is possible, as well, by comparing the results from objective and subjective evaluation measures. Descriptions of the program evaluation procedures are provided below, beginning with a brief description of the role played by the evaluator.

2.4.1 Evaluator

To eliminate any conscious or unconscious bias that might have occurred had the
investigator/therapist been involved directly in the evaluative procedures it was decided that another person would act as the evaluator. The evaluation sessions were supervised by the investigator, but the procedures were conducted by a graduate-student research assistant (referred to as D) employed by the School of Audiology and Speech Sciences. The research assistant administered tracking exercises and the TOPICON procedure. Although she was familiar with Erber's approach, she functioned as an evaluator rather than as a therapist. She did not participate in therapy sessions, nor was she aware of the particulars of therapy activities. In addition, by limiting personal interaction with S, she was able to maintain her role as a relatively unfamiliar communication partner. By choosing an unfamiliar evaluator, it is assumed that changes in objective measures can be attributed in the greatest part to program benefit, rather than to increased familiarity between S and D.

2.4.2 Objective Evaluation Measures

The objective measures provided data which were analyzed to identify and quantify conversational behaviour. The following sections look at the TOPICON and tracking measures by describing: A. Procedure, B. Participants, C. Materials, D. Conditions of Presentation and E. Outcome Measures.

2.4.2.1 TOPICON

A. Procedures:

TOPICON (Erber, 1988) is a conversation about an identified topic (the name is a blend of TOPIc + CONversation). The procedure was not complicated: the subject carried on a conversation with another person about a particular identified topic. The topic was announced at the start of the conversation and the participants spoke about the topic for as long as they wished to; with a typical duration being in the 10 to 15 minute range. During the conversation the evaluator introduced ten
predetermined information items. After the conversation was completed S was asked to answer a series of questions that asked about the information items and then to provide answers to Verbal Protocol questions that asked about S's perceptions of the conversation (see Appendix 3: Verbal Protocol Questions). Five TOPICON conversations were conducted, one at each of the evaluation sessions. The conversations were recorded and later transcribed for analysis.

B. Participants:

D participated in all TOPICON conversations with S.

C. Materials:

D chose the topics of conversation, which were, in order: restaurants, camping, traveling, holidays and hobbies. D also prepared a list of ten questions that asked about the information items she introduced. The questions were four choice multiple-choice questions.

D. Conditions of Presentation:

All conversations were conducted in a double-room sound booth in quiet noise conditions. S wore his hearing aids and was able to see D through a window. A GSI 16 audiometer was used to present D's voice at 65 dB HL over two wall-mounted loudspeakers placed at 45 and 315 degrees azimuth. S wore a lapel microphone which was monitored through the talkback channel of the audiometer.

E. Outcome Measures:

The TOPICON activity provided a simple method of gathering data on measures related to conversational fluency, as well as data on conversation repair sequences. This information was used in an examination of benefit from therapy by determining
if the conversations of S became more fluent with therapy. The repair sequence data also made it possible to determine if S became more efficient in making conversation repairs as a result of therapy.

The information questions provide a measure of how much S actually understood of the conversation by sampling his comprehension for selected items of information conveyed by the partner during conversation. S was also asked to respond to a series of Verbal Protocol questions following each TOPICON procedure. The questions ask about the subjects feeling and perceptions of the preceding communication (See Appendix 3 for a copy of the verbal protocol). The verbal protocol questions were compared to information available in the transcripts to see if S’s impressions were accurate, if his awareness of his performance changed and to see if he felt differently about the conversations as therapy progressed.

This procedure provides a “naturalistic” means of assessing conversational fluency. The participants in fact, considered it little more than a friendly chat. It must be noted however, that imposing an identified topic on a conversation is not typical of informal conversations. We can make a distinction between conversation types noted by Brown and Yule (1983); speaking “topically’ and speaking “on a topic” differ in some aspect. Speaking topically may be the more typical conversational style, in that participants contribute equally, but there is no fixed direction in which the conversation must proceed. Speaking “on a topic” requires the participants to make their contributions relevant to an identified topic entity. This format may be characteristic of formal or some situational conversations where a topic can be identified by the participants, but is not necessarily the situation in informal conversation. The TOPICON activity, employed in this study, follows more closely the latter type of conversation, but topic shifts and topic introductions occurred within the framework of the general identified topic nonetheless.
2.4.2.2 Tracking

A. Procedure:

The procedure requires a sender and a receiver. The sender reads from a prepared text and the receiver is required to repeat verbatim. In the present study the sender presented the text segment by segment and when misunderstandings occurred, clarification and precise repetition was required before moving on to the next segment. The exercise was timed to yield rate scores, and audio recordings were made in order to analyze repair sequences.

A series of multiple choice questions, based on the content of each tracking text was given to S (the receiver) following each exercise. The questions were answered immediately after the tracking exercise was completed to minimize memory demands. If the text was not completed after 15 minutes, the sender continued to a point marked in the text that corresponded to the end of a subset of the content questions. S was asked verbal protocol questions following completion of the content questions. The questions were included in the procedure to encourage attention to the information content of the text, and also to provide an objective measure to compare against the subject's own estimation of how much he understood of the exchange.

The instructions given to the sender and receiver provided information about the purpose and general method of the procedure, but did not prescribe clarification strategies or the amount of text to be presented in each segment. The most important instruction given to the participants was that they must work together to get an exact repetition in as efficient and quick a manner as possible.

Variations in tracking procedure are reported in the literature, usually in regards to the way the text is segmented and in the degree of restriction governing clarification strategies. For example, Owens and Raggio (1987) adopted a protocol that allowed nonverbatim as well as verbatim responses in training procedures, and
established a hierarchy of clarification directives that were receiver initiated. Tye-Murray and Tyler (1988) make recommendations as to standardizing and limiting the sender's repair strategies and the receiver's responses. This may be appropriate when only rate measures are collected as data or when the procedure is used as a training procedure. However, these recommendations were rejected as constraints in this study, where both the tracking rate and repair sequences were variables being assessed. It is for the above reasons that instructions limiting receiver and sender behaviour were not given.

B. Participants:

S acted as the receiver with both CP and D acting as senders. S and CP completed two tracking texts in each evaluation session; one narrative text and one descriptive text (a description of the text types follows in the materials section of this discussion). The schedule for CP and S was modified slightly to keep the evaluation sessions within a reasonable time frame (i.e. 2 hours). In evaluation 1, CP completed one narrative tracking text with her brother. Time restraints that day prevented further testing. In evaluation sessions 2, 3 and 5 they completed two texts; one of each text type. In evaluation 4 they completed one narrative text. In total S and D completed ten tracking texts and S and CP completed eight texts.

C. Materials:

The materials used for tracking were classified according to two text types: narrative and descriptive. Narrative texts are “story-like”; they are accounts of personal events and may show internal coherence through temporal, causal or additive relationships (See Hudson and Shapiro, 1991; Johnston, 1982; and Westby, 1984 for elaboration on these points). Narrative text relies on the identification of setting and on episodes of conflict and resolution, or event and consequence, for
logical connections. Comprehension of narrative text is assisted by text organization
that helps frame information (i.e. schema, script and scene). This contributes to the
formulation of expectancy and anticipation of probable events in the story line.

The purpose of descriptive text is usually to introduce information on a particular
topic, and as such it may contain a greater proportion of novel or unexpected
information than does a narrative. The descriptive texts are typically more difficult
than narrative texts in tracking exercises (Owens & Raggio, 1987).

The narrative texts used in this study were drawn from different sources; six were
prepared for the purposes of this study and four were taken from a popular book of
narrative essays by S. McLean (1989). The descriptive texts were derived from
restaurant reviews that appeared in various newspapers. All texts were processed
by the computer program Grammitik IV (Reference Software International 2.0, 1988-
91) which examines the text and provides a Grade Level Score and a Reading Ease
Score (RES) which are based on grammatical complexity, sentence length and average
word length. The texts were prepared so that they all came within a standard RES of
65-75, and a grade range of 6-8.

The texts of each type were selected at random for use in different evaluation
sessions, with no text being used more than once. They were printed out in a format
that presented a segment consisting of a phrase or clause on each line. The senders
were given these forms for presentation, but were not given any instructions
requiring them to transmit their message according to that division of text.

Attention to material is recommended by Tye-Murray and Tyler (1988) who point
out that repeated presentation of text or sequential presentation from a longer text
may result in improvement of rates over time. The results may reflect familiarity with
the text, or a growing familiarity with the story line and other elements of the
narrative. The solution used in this study, was to prepare a number of independent
but comparable texts and use them on only one occasion.
D. Conditions of Presentation:

The tracking was done in a double-room sound-treated audiometric test chamber located at the School of Audiology and Speech Sciences at the University of British Columbia. A GSI 16 audiometer was used. The sender and receiver were able to see each other through a window separating the two rooms. The receiver sat facing the sender and was presented with the signal through two wall mounted GSI speakers at 45 and 315 degrees azimuth. The receiver wore a lapel microphone which was monitored through the audiometer talkback channel. The exercise was tape recorded with a Marantz PM420 tape recorder using a Radio Shack PZM microphone.

Tracking with D as sender was conducted in quiet conditions with D's voice presented at 65 dB HL. This condition was also used in evaluation 1 with CP as sender. In that evaluation S and CP experienced very little difficulty, so it was decided that subsequent narrative texts would be made more difficult by introducing noise over one channel. In the remaining evaluations narrative text tracking was conducted with speech presented at 65 dB and noise at 40 dB HL. The noise used was 8-talker babble. The descriptive text tracking continued to be done in quiet conditions.

<table>
<thead>
<tr>
<th>Figure 2.2 TRACKING CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sender</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>Unfamiliar: D</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Familiar: CP</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
E. Outcome Measures:

The tracking procedure has been used, and evaluated critically, as both a training and an evaluation method for aural rehabilitation (De Filippo and Scott, 1978; Owens and Raggio, 1987; Tye-Murray and Tyler, 1988). It was developed in response to the need for procedures in aural rehabilitation that employed connected speech that would be more naturalistic than the many word and sentence lists that were available (De Filippo and Scott, 1978). In the tracking procedure the speed of verbatim repetition is taken as a measure of speech understanding. The rate measure is an index of the efficiency of message transmission, where misunderstandings and the clarification exchanges consume time and thereby reduce the overall rate. The procedure is not intended to mimic naturalistic conversation, but rather it employs connected discourse where other measures use syllable, word or sentence lists that lack the internal coherence that characterizes a text.

There are a number of criticisms that have been leveled against the tracking procedure as an evaluative test measure. Primary among these are uncontrolled characteristics of text, sender and receiver. Within-subject test design has the effect of attenuating some of the problematic aspects, which become increasingly crucial if across-subject comparisons are made (Tye-Murray and Tyler, 1988). In the case of this study a within-subject design is used; the tracking rates of the subject are compared across the course of the study in a time series.

Tye-Murray and Tyler (1988), as well as other investigators (Owens & Raggio, 1987) have accurately pointed out the effects on performance that can result from presentation of different text types. With growing information about the processes whereby different text types are comprehended and about how they are structurally composed, some control over this variable can be exerted. In this study the text materials were standardized within limits as described above. It may well be
impossible to devise precisely equivalent texts for the reasons that an individual receiver's familiarity with vocabulary and subject content will be an uncontrolled variable. Reasonable limits of equivalency have to be determined, and researcher awareness of variability is essential when interpreting data.

In this study tracking rates are calculated as syllable per minute rates rather than as words per minute in order to reduce variability due to uncontrolled word length. Additionally, rates were determined for each phrase or presentation segment of text that the sender presented for repetition by the receiver. These rates were arrived at by determining the individual rate for each presentation segment of text and then calculating the rate for the median and quartile values of that text. Outliers that result from particularly difficult or easy segments were identified, with a resulting further standardization of text.

In addition to tracking rates the tracking data was analyzed to determine if any changes associated with therapy occurred in the clarification sequences.

2.4.3 Subjective Evaluation Measures

The subjective measures used in this study were used for two purposes: to gather information about program benefit and to gather information about the participant's impressions of their conversational abilities. These self report measures were collected in the Hearing Performance Inventory and by a personal interview conducted after therapy was completed.

2.4.3.1 Hearing Performance Inventory

The HPI was designed to assess hearing performance in typical listening situations (Giolas et al., 1979). It has been recognized as useful for planning rehabilitative procedures and for assessment of rehabilitation programmes (Alpiner & Schow, 1993).
The HPI describes a variety of listening situations, and the respondent rates her/his listening performance in these situations by reference to a 5 point numeric scale. The end points on the scale ranges from understanding what a person says in the described situation “practically always” to “all most never”. The respondent can also choose “not applicable” if that is her/his judgement.

S completed the Hearing Performance Inventory (HPI) at the start of the program and then again after the program was completed. This version of the questionnaire consisted of 131 questions and an introductory note that provided instructions. S was given the questionnaire to complete at home and it was returned before therapy began. The final copy was mailed to the investigator along with a final evaluation form.

2.4.3.2 Interview

The self-report approach to assessment has been found to be sufficiently consistent to yield reliable measures (Walden et al., 1984; Oja & Schow, 1984; Cox et al. 1991). Specific attention to an individual’s perceptions of benefit and satisfaction, along with reports on frequency or amount of use have provided a valuable method of evaluating hearing aids. This study followed that approach by asking S and CP about the use, benefit and satisfaction they felt they had gained from therapy.

In this approach, “use” refers to the actual or reported amount of time a hearing aid is used. This aspect is herein modified to reports on the estimated use of the strategies and techniques integral to the present program in actual conversations outside of therapy. Benefit is related to an improvement in some aspect of communication and can be identified by anecdote. Satisfaction is an entirely subjective measure that is measured by asking the individual to report on his/her feelings.
A series of questions was prepared that targeted each of the use, benefit and satisfaction areas of evaluation. S and CP were given a written copy of the questions to think about (See Appendix 4 - Interview Questions). These questions were discussed in a meeting that was conducted at their home. Separate interviews were conducted with S, with CP and with their parents. All interviews were audio taped.

Concurrent with the interview, S and CP were also asked to complete a series of questions that related to the manner in which the therapist/investigator had conducted the program and an evaluation of the therapist's contribution to the progression of therapy. These questions (also presented in Appendix 4) were responded to in writing and mailed in at a later date. There were two reasons behind this approach. First, in the course of therapy, as many therapists will attest, a personal as well as professional relationship is often developed. Whatever the nature of these relationships, there exists the possibility that the personal relationship might colour subjective reports that clients provide in evaluative questionnaires such as this. It was thought that by making a distinction between the program itself and the individual responsible for delivering it this possible confounding factor might be minimized. There was a separate and identified forum for each area of evaluation. Furthermore, rather than have the participants talk to the investigator directly, they were able to write and mail their comments about him after all other program activities were completed.
CHAPTER 3
ANALYSIS

3.0 DATA ANALYSIS

Raw data collected during evaluations were in the form of audio tape recordings made of the tracking and TOPICON conversations. The recordings were first transcribed and then analyzed according to procedures that are described in this chapter. The analysis of TOPICON conversations consisted of applying a series of fluency related measures and of categorizing clarification requests and repairs. The tracking procedure yielded rate scores, and the clarification sequences were also analyzed.

Presented in this chapter are sections that:

a. describe the transcription format,
b. define the fluency measures collected,
c. define the taxonomy of clarification requests and repair strategies,
d. describe analysis procedures and rules.

3.1 TRANSCRIPTION

Audio tape recordings made during Tracking and TOPICON assessment procedures were transcribed in an orthographic format. Transcriptions were prepared for all five TOPICON conversations, and for 14 of the 18 tracking texts. Technical problems at the time of recording rendered one of S and CP's tracking texts unsuitable for analysis – leaving seven of the eight tracking exercises completed by S and Cp available. These seven were matched with the equivalent texts with D as sender. Altogether four narrative and three descriptive texts with each of the two senders were analyzed, for a total of 14 tracking texts.

In the transcriptions of the TOPICON conversations each speakers turn was
indicated by sequential number. In order to assist in the analysis of fluency related measures, the contents of a turn were divided into clause units, with one clause unit per line. Pauses of longer than three seconds were noted. Intonation contours were considered in the identification of information questions, clarification requests, and clausal units.

The transcripts of tracking exercises presented each speaker’s turn on a single line. The utterances were not divided into clausal units because fluency analysis was not done on the tracking transcripts.

3.2 CODING CONVERSATIONAL FLUENCY MEASURES

Transcriptions of TOPICON conversations were analyzed to provide information related to Erber’s (1988) concept of conversational fluency. The coding categories that examine conversational fluency are proposed by Pichora-Fuller and Johnson (1993). They include categories based on Erber’s measure of conversational fluency, but include others that provide related analysis information. Definitions of the categories are listed below:

Duration

Conversation length was timed in minutes and seconds. Erber expresses the assumption that length of conversation is an informal metric of participant interest. He suggests that various ratings, including turns per minute, are available to quantitatively describe conversations (Erber, 1988: p. 188). Timing the conversation allows the calculation of turns per minute and clauses per minute.

Turns

Each turn included all the utterances from the point when a speaker began to talk until the other speaker assumed the floor and began talking. A pause of three
seconds or longer also marked a turn end, even if the same person spoke again, provided that the utterance had utterance-final intonation and was not a filler or indicator of intention to continue (e.g. uhmm, let's see now, etc.). Backchannel responses were not counted as turns.

Backchannel Responses

Backchannel responses are defined as affective or acknowledging remarks ("oh," "yeah," "uhuh," etc.). The following conditions apply: they are not a preamble to a move to take the floor; the speaker who holds the floor does not yield the floor; they are not typically preceded by a pause.

Backchannel responses provide a potential (though somewhat unreliable) measure of comprehension. They may be expressed to indicate comprehension, or they may be a type of ploy used by some individuals to show attention and interest, thereby maintaining interaction with partners without actual comprehension.

Clauses

A clause is defined as a unit of speech that selects independently for mood; that is, it is an autonomous declarative, interrogative, imperative or exclamatory structure (Martin 1977; Ruthven, 1989). For the purposes of text segmentation, an independent clause was defined as a sentence constituent which had a subject and predicate, and included any related subordinate clauses, when present. Subordinate clauses included relative, complement and adverbial clauses. Generally, *while*, *if*, *because*, *after*, *before*, and *when* introduce adverbial clauses. Conjoined structures coordinated by *and*, *so* and *but* were counted as discrete clause units. Utterances with conjoined structures in which subject ellipsis occurred were counted as one clause (e.g. "I spend most of my time watching sitcoms and watching soap operas"). Verbless utterances such as "yeah" or "really" were counted as independent clauses if
they filled a sentence contour, counted as one idea unit, and were not backchannel responses. False starts and incomplete utterances were not counted as clauses if major grammatical elements were missing (e.g. “I like to go to ...”).

Acknowledgement Only Turns

These are turns in which the content is an acknowledgement of the prior speaker’s contribution (e.g. “yeah”) with no additional content. Turns that included both acknowledgement and new content are not counted in this category. In form these turns are like backchannel responses. They differ in that they occur at transition relevant points (e.g. after a pause or after the new information in a turn has been said and the other speaker yields the floor).

No Response

This is coded when Speaker 1 has paused to yield the floor, or has attempted to elicit a response form Speaker 2, but Speaker 2 does not respond within an appropriate time (about 1 second), and Speaker 1 resumes speaking. This is a potential measure of comprehension, in that Speaker 2 may not know it is her/his turn to speak.

A gap is said to occur in conversation when there is a pause of 3 or more seconds between turns. A gap may be particularly disruptive to conversation and so, while the gap may signal a no response turn, they were scored separately. A gap may be followed by a turn by either speaker.

Within-turn pauses of 3 or more seconds in length also occur, but these are marked that Speaker 1 plans to continue speaking either by nonfinal utterance intonation, or with a filler (e.g. “uhmm...”) or a phrase (e.g. “let me see now...”).

Gaps are a potential measure of comprehension, in that the listener either does not know it is her/his turn, or is taking unusually long to formulate a response.
Difficulty in formulating a response can mean that the prior utterance(s) was/were not completely heard or understood. Alternately, it can indicate that the prior turn is difficult to respond to or has provoked a thoughtful response.

**Topic Initiations/Shifts**

Conversations, including those of the TOPICON exercise, which have an identified "topic," are characterized by gradual topic drift. Each speaker develops the topic by contributing new, personal knowledge. An ideal turn in a conversation has several components: (1) a part that relates it to the preceding turn; (2) new information; and (3) a part that gives the floor back to the other participant. If the new information is discontinuous with the information in the prior turn, a new topic has been initiated, or there has been a shift in topic. The difference between topic initiation and shift is one of degree, and in some instances the difference may be of subtle magnitude. Functionally both are the same; they are discontinuities in the ongoing conversation, and if there is uptake (i.e. the move is successful), the speaker who changed or shifted the topic takes control of the conversation.

A topic discontinuity can indicate a variety of motivations; for example, it may signal the speaker's desire to communicate something brought to mind by the conversation, the speaker's preference to be in control of the conversation, or the speaker's lack of hearing/understanding the content of the prior turn. Thus, topic discontinuity is one place to look for potential hearing/comprehension problems.

A general topic for each TOPICON was announced before the conversation commenced. The initial turn, in all instances, was closely connected to the predetermined topic and therefore not counted as a topic introduction.

**Interruption Overlaps**

This category includes instances where the two speakers talk at the same time, with
the overlapping speech being interrupting in nature. This contrasts with overlaps at transition relevant points, where overlaps occur without being disruptive to the conversation.

An interruption overlap occurs when speakers want to take, or hang onto, control of the conversation. They also occur when a speaker believes the conversational partner has finished a turn, and thus, can indicate lack of comprehension.

Information Questions

Information questions are asked to obtain new information. They are restricted to questions that refer to the content of the conversation and advance topic development. They do not include clarification questions that are asked to repair the conversation when something was not heard.

Explicit Statements made about Hearing/Understanding

These are explicit comments about not having heard or understood the partner's speech. These comments are statements with content related to hearing or understanding and do not occur in the interrogative mood (e.g. “I thought you said ...” or “I didn’t hear that”).

3.3 DEFINITION of REPAIR SEQUENCE CATEGORIES

A taxonomy was required to classify the Requests for Clarification and Repair Strategies that were used by the partner in the tracking and TOPICON exercises. The repair sequences were looked at to ascertain the type of clarification request made in the case of elicited repairs and the repair strategy/response used to make the repair. This analysis was done to determine if there were changes in the frequency or types of clarifications used that would indicate improved efficiency and fluency in conversation (see section 1.3.3 for discussion of efficiency and fluency). Efficient
clarification sequences are presumed to be ones that provide the most direct route to conversational repair, or consume the smallest amount of conversational resources (i.e. turns, time, effort, etc.).

Data were analyzed for both S and the person with whom he was communicating (CP or D). Categories for analysis were based on those used in studies of contingent queries and conversation repair. Contingent queries can be understood as conversational repair mechanisms, where the repair is accomplished by provision of the information requested by the query. Garvey (1977) introduced the idea that contingent queries can be examined according to the selectivity and the determining functions inherent in the form of the query. According to Garvey the selectivity function identifies information that was not understood in a preceding utterance; or alternately, the query may be nonspecific and simply indicate misunderstanding. The determining function exercises influence over the choice of appropriate responses to the query by requesting a particular type of reply. Together the combination of the selectivity and determining functions may shape the form and content of the response, for example, the query “You put what in the garbage?”. The type and combination of these functions provides a way in which to examine and quantify the mechanisms by which conversational dysfluencies are resolved.

The categories of clarification requests and repairs used by Cassie and Rockwell (1993) were adopted (with some modification) to denote the selectivity and the determining functions as described by Garvey (1977). Analysis was not limited by the Cassie and Rockwell categories, but was adapted to include others categories motivated from within the data. Some of the categories that were added were needed to examine the tracking data, which is not a natural conversation situation and required the introduction of additional categories.

The initial step of analysis was to make a classification based on Garvey's distinction between Solicited and Unsolicited queries. Solicited clarification requests
(or queries) are requests that are invited by an utterance which has the intended purpose of soliciting a clarification request, for example,

- Preceding Utterance: Talker 1 “You know what I’m talking about?”
- Solicited Query: Talker 2 “Camping in Nova Scotia?”

Unsolicited requests are not explicitly elicited by a preceding utterance.

Subsequent classifications were then made on the basis of the specific/nonspecific selectivity function, and then according to various determining functions. Determining functions are identified as a “Requests for X”, where x= repetition, confirmation, elaboration. So, for example, the clarification request “you went where after the show?” would be specified as an “unsolicited specific request for repetition”.

The following sections provide definitions of the clarification request and repair strategy categories.

3.3.1 Clarification Requests

The categories used by Cassie and Rockwell (1993) in their study of repair strategies were adopted as a basic outline for classification of functions in this analysis. These researchers do not refer to “functions,” but do identify Specific and Nonspecific requests of different types. Their categories are taken from a variety of sources, who in turn have taken their categories from Garvey (1977).

There are a number of differences between the classification systems of Garvey (1977) and Cassie and Rockwell (1993). It should by noted that Cassie and Rockwell use “Specific” and “Nonspecific” in a different way than Garvey; they make a distinction between requests that simply indicate misunderstanding (e.g. Nonspecific - Huh?, What?) and all other requests that are more specific about clarification. Their taxonomy does not distinguish between selectivity and determining functions. Also, they do not use a third selectivity function that Garvey
terms “Potential”; the Potential function identifies some element or information that is not included in the utterance, but is available; that is, the request asks for more information that is “potentially” available. In Cassie and Rockwell’s scheme “Requests for explanation/elaboration” are a type of specific request that covers requests for additional information; it includes Garvey’s potential selectivity function.

Identifying the more inclusive “Request for elaboration/explanation” has some utility when examining data involving clarification requests made by hearing-impaired individuals. Garvey’s definition of the potential selectivity function presupposes that the requester understands what has been said, but that the information in the utterance is in some way incomplete. The clarification requests made by hearing-impaired persons are primarily motivated by perceptual problems and as a first step, unlike normal-hearing listeners, they need to know what has been said. Transmission of the message may be accomplished by the provision of more or related information, or by elaboration of the original message. Therefore these requests are not “potential” in the sense intended by Garvey, but they do have the same determining functions.

Modifications to Cassie and Rockwell’s (1993) classification scheme included dropping their category “Nonspecific Nonverbal Request for Clarification” because this category includes visual cues which were not available for analysis on the audio tapes used in the present study. The category “Specific Request for a Change in the Manner of Presentation” (e.g. “Would you speak slower”) was also dropped because the data provided no occurrence of this request type.

Definitions of the categories used in the present study, along with examples, appear below. Different wording of the Cassie and Rockwell definitions are refinements that were made to improve the precision of the categories and to increase the accuracy of the analysis.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Solicited and Unsolicited</td>
<td>Solicited and Unsolicited</td>
<td></td>
</tr>
<tr>
<td>requests for clarification</td>
<td>requests for clarification</td>
<td></td>
</tr>
<tr>
<td>Selectivity Function</td>
<td>Selectivity Function</td>
<td>Specific and nonspecific</td>
</tr>
<tr>
<td>- Specific and nonspecific</td>
<td>- Specific, nonspecific and</td>
<td>requests for clarification*</td>
</tr>
<tr>
<td></td>
<td>potential</td>
<td></td>
</tr>
<tr>
<td>Determining function</td>
<td>Determining function</td>
<td></td>
</tr>
<tr>
<td>a. Specific request for:</td>
<td>**</td>
<td>*</td>
</tr>
<tr>
<td>- repetition of a specific</td>
<td>- repetition</td>
<td>a. Specific request for:</td>
</tr>
<tr>
<td>constituent</td>
<td></td>
<td>- repetition of a specific</td>
</tr>
<tr>
<td></td>
<td>- confirmation of message</td>
<td>- confirmation of message</td>
</tr>
<tr>
<td></td>
<td>- confirmation of topic</td>
<td>- confirmation of topic</td>
</tr>
<tr>
<td></td>
<td>- explanation/elaboration</td>
<td>- explanation/elaboration</td>
</tr>
<tr>
<td></td>
<td>- specification</td>
<td></td>
</tr>
<tr>
<td></td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>b. Nonspecific request for:</td>
<td>--</td>
<td>b. Nonspecific request for:</td>
</tr>
<tr>
<td>- repetition</td>
<td></td>
<td>- repetition</td>
</tr>
<tr>
<td></td>
<td>--</td>
<td>- Nonverbal clarification</td>
</tr>
</tbody>
</table>

* Cassie and Rockwell (1993) do not identify selectivity and determining functions, but use instead a taxonomy based on the distinction between specific and nonspecific requests for clarification.

** Garvey (1977) notes a degree of independence between the selectivity and determining functions (pp. 70-71), but does not elaborate on any restrictions that might limit the combination of certain functions.
1. Nonspecific requests:

Neutral request that indicates the message was not perceived. May be expressed either directly (e.g. “Huh?” “What?”) or indirectly (e.g., “I didn’t get that.”).

2. Specific requests:

Requests that indicate a specific constituent of the utterance for clarification, or are specific about the type of information that is required for clarification.

a. Request for repetition of a specific constituent:

A wh-question formulated in such a way that the portion of the message that was not understood is targeted, or an exact repetition of the utterance, with rising intonation, up to the point of communication breakdown, or comments about the part of the utterance that was not heard. Examples:

i. -“Do you ever do any tricks on anybody?”
   - “Any what?”

ii. “In the back of Al’s truck”
   - “In the back of ...?”[intonation level]

iii. “I didn’t get the last two words”

b. Request for confirmation of the message:

Partial or full repetition of the perceived message using rising intonation, or preceding it with “Did you say ...?”, and not specifically requesting any new/additional information. Example:

- “Have you ever been to The Keg or Earl’s?”
- “to the PNE?”
- “to the Keg”
c. Request for confirmation of the topic:

Utterance that inquires about whether the partner is talking about a particular topic. Example:
- “I like visiting the PNE”
- “What about food?”
- “Food?”
- “yeah, we’re still talking about food”

d. Request for explanation/elaboration:

Utterance used to acquire additional or new information that might facilitate understanding. The request may incorporate the new information, which distinguishes this request type from requests for confirmation. Example:
- “Is there any other place?”
- “That I like to go (yeah) besides restaurants?”
- “No, besides Boston Pizza”

Based on the above, all clarification requests were coded for one of the following categories at each level:

1. Unsolicited or Solicited
2. Unspecific Request or Specific Request
3. Specific Requests coded for one of the following:
   - a. Request for repetition of a specific constituent
   - b. Request for confirmation of the message
   - c. Request for confirmation of the topic
   - d. Request for explanation/elaboration
3.3.2 Repair Strategies

Analysis of repair strategies was done for TOPICON conversations involving S and D and for the repair strategies used by CP, as the sender, in tracking.

An important part of the clarification process is the type of repair strategy that the communication partner chooses to use in response to the request functions. The partner may have a range of options open (e.g. in the case of a nonspecific request), or she may not comply strictly with the request. Additionally, in conversations, instances may occur where one person realizes that her partner has misunderstood what she said, and clarification is made without a request. In such cases there is an open field as far as the choice of repair strategy. The types of repair strategies used in the conversations of this study are a potential source of information about program influence not only on S, but also on his therapy partner, CP.

Modifications to Cassie and Rockwell's repair categories included the addition of categories (identified at the end of the definition list) and the deletion of the "Nonverbal Cue" category, which is uncodable for the audio tapes used in this study.

The category "Change in prosodic features" was also deleted for several reasons. Modulation of prosodic features occurs for various reasons in conversation. Specifically, the changes may be related to rhetorical stratagem, content emphasis, or other purposes, one of which might be clarification. It is difficult to objectively differentiate clarification by a "change in prosodic features" from other reasons for prosodic change. Furthermore, most replies in contingent query sequences are marked as repeated utterances (Garvey, 1977). Repeated utterances are marked by prosodic and/or other changes such as, reduction in tempo, increased precision of articulation, increased loudness, widening of pitch range and/or use of contrastive stress. Finally, there were no instances in the data of a "Request for change in the manner of presentation". The absence of this particular request type eliminates a conspicuous means of identifying a prosodic change aimed at clarification.
An initial analysis decision was to decide whether the repair was elicited or unelicited by clarification request.

Elicited Repair- A repair that is elicited by an explicit request for clarification
Unelicited Repair- A self-initiated repair where there has been no explicit request for clarification from the partner.

Both elicited and unelicited repairs were categorized as follows:

a. Exact repetition - Full repetition of the misperceived message with no changes in wording. Prosodic variation may occur.

b. Partial repetition- Repetition of a portion of the misperceived message.
   Includes repetition of a key word.

c. Paraphrase- Rephrasing the message or replacing key words with others having similar meanings, without providing new information. Includes the use of antonyms, synonyms, and word associations. Example:
   - "When you've gone to the cottage ..."
   - "When you have what?"
   - "When you go to the beach"

d. Syntactic Modification - chunking the syntax of the message, such as breaking the misunderstood utterance into shorter segments. All the segments in one sequence were counted as a single instance of syntactic modification. In analysis the segments were identified as part a,b,c ...etc of the syntactic cue. In some instances, the segments of the initial division were further subdivided, by the sender into yet smaller chunks. These secondary chunks were then counted as an independent occurrence of the cue. In a sense the second cue is
embedded within the first. Example:

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1D- if they cut the logs up enough times</td>
<td>-reference segment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1S- if there was enough time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2D- if they cut</td>
<td>-syntax a</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2S- if they cut</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3D-the logs up enough times</td>
<td>-syntax b</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3S-they cut the log sometimes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4D-the logs</td>
<td>-syntax bi - chunking of syntax b</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4S-the log</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5D-the logs</td>
<td>-partial repeat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5S-the line</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6D-pieces of wood - logs</td>
<td>-paraphrase / partial repeat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6S-logs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7D-up enough times</td>
<td>- syntax bii -chunking of syntax b</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7S-up enough times</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The above example, taken from a tracking session, was counted with two Syntactic modification cues, one Paraphrase and two Partial repetition cues. The example shows other types of cues embedded within the syntactic cue. Even with the presence of other types of cues, it is possible to identify the segments of the syntactic divisions by comparing them to the initial presentation segment.

e. Confirmation- Yes/no answers, and full or partial repeat used as confirmation of the message or topic. Example:

- “Do you know any French?”
- “French?”
- "yeah"

f. Elaboration/explanation- Expressing additional information or defining keywords in order to provide supplementary cues. Example:
- "Have you ever heard of that"
- "Is it the name of a place?"
- "A book"

Additional Categories

Analysis of TOPICON and tracking transcripts showed that additional categories of repair strategies were needed to accurately examine the data. These categories were used in addition to those of Cassie and Rockwell:

g. Syllabic Cue - Where a word is broken into syllabic units (e.g. rotisserie--> ro + tis + erie). In some cases the syllables of the word were not presented in entirety or in sequence. For this reason each time a syllable of a word was used as a cue, it was counted as an independent occurrence of the cue.

h. Spelling Cue - Spelling a word letter by letter. This cue was used in two different ways by the sender. In some cases the entire word was spelled in one turn, in other cases each letter was presented for the receiver to repeat, before going on to the next letter. In both of these cases, if the exchange was sequential and the entire word was completed before proceeding it was counted as a single cue.

i. First letter/sound - Where the first sound or letter of a word is provided to aid in word identification.
j. Metagrammatical Cue - Identifying the part of speech or grammatical tense of a misperceived word. Examples:

   i. -"It's an adjective"
   ii. -"grown"
      -"grow ?"
      -"past tense, grown"
      -"grown"

3.3.3 Tracking Analysis Decisions

This section describes decisions made in the analysis of tracking transcripts. Once the sender presented a segment of the text this became the reference segment for analysis, until it was repeated correctly by S and the next segment was then presented. This decision about the analysis is in contrast to a strict local analysis where reference is made to the immediately previous utterances. For example, an "Exact Repetition" was an exact repetition of the words of the initial presentation chunk. Likewise, a "Partial Repetition" was a repetition of part of that initial segment, regardless of the sender’s immediately previous utterance. In this analysis procedure the sender could use the same “partial repetition” on two successive turns and they would be classified as two partial repetition, rather than as one partial and one exact repetition (see the example in Section 3.3.2 under the definition of Syntactic modification).

3.4 REPAIR SEQUENCE ANALYSIS

In order to consider the efficiency of repair attempts in TOPICON the repair sequences were looked at in relation to the conversations in which they occurred. The following measures were calculated:

   a. Turns - the total number of conversation turns involved in clarification sequences.

79
Turns are defined in Section 3.2 Coding of Conversational Fluency Measures.

b. Clauses - the total number of clauses used for clarification sequences. Clauses are defined in Section 3.2.

c. Clarification Turns to Total Turns: the ratio of clarification turns to total turns in the conversation. This indicates the proportion of the conversation turns that are devoted to repair, rather than to information or social exchange.

d. Clarification Clauses to Total Clauses: the ratio of clauses in clarification sequences to total clauses in the conversation. This measure is an indication of the proportion of the clausal content in the conversation devoted to repair.

e. Repaired with One Cue: the ratio of clarification sequences repaired with one cue to the total number of repair sequences. This is a measure of the efficiency of clarification attempts. The most efficient repairs are those made with one cue.

The following calculations were made in the evaluation of repair sequences in tracking:

a. Average length in syllables of presentation segments: the average length of segments presented by the sender for a particular text. It is possible that some changes in the number of initial correct responses are due to the sender presenting smaller initial segments as a kind of preventative syntactic modification cue. This information would show if this was a strategy that was used and if it is a possible contributing reason for any improvement in initial correct responses.
b. The number of initial correct responses: the proportion of initial correct responses to total segments of text presented by the sender. Rate will be determined, in part, by the number of segments that the receiver can repeat correctly without any repair. This is a potential measure of the receiver's ability to use comprehension strategies learned in therapy to understand the text material.

c. The proportion of segments that were corrected with one repair cue: the number of text segments repaired with one cue divided by the number of text segments requiring repair. Normally a repair results in two extra turns -- one repair cue and one corrected repeat. In the case of syntactic modification there may be more turns involved, depending on how many chunks the sender chooses to break the initial utterance up into. Either way, this calculation provides a measure of "efficient" (least time consuming) repair sequences.

d. Combined initial correct responses with repairs made with one cue: the number of segments repeated correctly plus the number repeated with one repair cue divided by the total number of segments in the text. This calculation shows the extent to which the sender and receiver are operating at "maximum efficiency"; i.e. they are either getting the response right the first time or are using an efficient repair when they don’t.

3.5 TRACKING RATES

Tracking rates are considered to be an index of communication efficiency. They show the rate at which information can be conveyed with accuracy. The rates in this study were calculated as the number of syllables of text material that were repeated correctly by the receiver per minute (See Chapter 2: METHODS, for a description of tracking procedures). To determine the rate for each tracking
text a stopwatch was used to measure the time required for the participants to get an accurate repetition for each presentation segment. The number of syllables for each segment and the time duration were entered into a computer run statistics program which calculated the median time and the interquartile range each tracking text. This procedure was chosen in an attempt to avoid arriving at rate scores that were skewed by extremely difficult or extremely easy sections of text, which could either significantly reduce or elevate the rate. In this way a rate more representative of overall efficiency is obtained by eliminating the outliers at either end of the range of rates for each text.
This chapter presents the results of evaluation and analysis procedures. Presented first are the objective measures collected in the TOPICON and tracking procedures. TOPICON provided information for assessment of: conversational fluency, the clarification requests and repair strategies used in conversation, repair sequence efficiency, and verbal protocol and comprehension question results. The tracking procedure provided information about: tracking rates, the requests for clarification made by S, the clarification strategies used by CP, repair sequence data and verbal protocol and comprehension question results. The subjective measures, that follow, were gathered from the Hearing Performance Inventory questionnaire and a family interview.

4.1 OBJECTIVE MEASURES

4.1.1 TOPICON

One TOPICON conversation was conducted at each of the five evaluation sessions, and involved S and D (assistant evaluator). The five topics of conversation were determined prior to each evaluation by D, and were respectively: restaurants, camping, travel, holidays and hobbies. Each conversation was followed by a series of prepared questions and a standard set of verbal protocol questions.

The TOPICON measure was the most "naturalistic" conversation measure used. The conversations provided data that was examined with a set of evaluation measures for insights into the makeup of fluent conversations, and the ability of S to converse in a fluent manner. A speech-language pathologist, not directly involved in this project, listened to audio recordings of the conversations and made judgements about the fluency of the conversations on a scale from 1 to 5 (low to high fluency).
This judge was given general instruction about elements that might contribute to fluent conversations but did not know the order in which the recordings were made.

4.1.1.1 Conversational Fluency Measures

Table 4.1 (see p. 85) displays the conversational fluency measures collected in the TOPICON conversations. Measures, where appropriate, are reported for both S and D. Duration is reported in minutes and seconds, and is used in the calculation of turns and clauses per minute. The bottom row presents the fluency ratings given each conversation by the speech-language pathologist who judged the conversations.

The data does not illuminate any single item, or series of items, that correspond to the range of fluency ratings for all the conversations. The fluency ratings made by the judge rated the TOPICON conversation at evaluation four as the most fluent. There are some features of this conversation that distinguish it from the others. For example it has the fewest turns and turns per minute, the most clause per turn, the lowest clause per minute ratio, the fewest Information Questions by S, the fewest “Topic Initiation/Shifts”, and the fewest “Acknowledgment Only” turns. Despite the fewest number of “Acknowledgement Only” turns, the relatively low number of turns taken by the participants in the TOPICON conversation at evaluation four makes the percentage of Acknowledgement Only turns for each of them among the highest of any conversation.

A description of conversational fluency based on the TOPICON data collected in evaluation four would characterize the conversation as one in which the participants contributed the most information content with each turn and avoided frequent topic shifts/changes. Some typical conversation features such as Acknowledgement Only turns, backchannel responses, overlaps, gaps greater than three seconds, and no response turns were similar to the other conversations in frequency of occurrence.

Other factors, such as the frequency and effectiveness of repair sequences may be
<table>
<thead>
<tr>
<th>ANALYSIS DATA</th>
<th>Evaluation 1</th>
<th>Evaluation 2</th>
<th>Evaluation 3</th>
<th>Evaluation 4</th>
<th>Evaluation 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S</td>
<td>D</td>
<td>S</td>
<td>D</td>
<td>S</td>
</tr>
<tr>
<td>Duration</td>
<td>13:07</td>
<td>11:32</td>
<td>10:12</td>
<td>11:10</td>
<td>15:16</td>
</tr>
<tr>
<td>Turns</td>
<td>87</td>
<td>88</td>
<td>70</td>
<td>71</td>
<td>61</td>
</tr>
<tr>
<td>Clauses</td>
<td>105</td>
<td>158</td>
<td>114</td>
<td>125</td>
<td>79</td>
</tr>
<tr>
<td>Information Questions</td>
<td>12</td>
<td>33</td>
<td>17</td>
<td>16</td>
<td>12</td>
</tr>
<tr>
<td>Acknowledgements Only</td>
<td>9</td>
<td>2</td>
<td>10</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Backchannel Responses</td>
<td>30</td>
<td>17</td>
<td>41</td>
<td>20</td>
<td>34</td>
</tr>
<tr>
<td>No Response Turns</td>
<td>1</td>
<td>--</td>
<td>1</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Overlaps</td>
<td>7</td>
<td>4</td>
<td>7</td>
<td>4</td>
<td>--</td>
</tr>
<tr>
<td>Gaps &gt; 3 Seconds</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Topic Initiations/Shifts</td>
<td>5</td>
<td>18</td>
<td>3</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>Comments on Hearing</td>
<td>1</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>DERIVED MEASURES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turns/Minute</td>
<td>13.3</td>
<td>12.2</td>
<td>12</td>
<td>6.4</td>
<td>11.9</td>
</tr>
<tr>
<td>Clauses/Minute</td>
<td>7.9</td>
<td>12</td>
<td>9.9</td>
<td>10.8</td>
<td>7.7</td>
</tr>
<tr>
<td>Clauses/Turn</td>
<td>12.2</td>
<td>1.8</td>
<td>1.6</td>
<td>1.8</td>
<td>1.3</td>
</tr>
<tr>
<td>% Turns Acknowledgement Only</td>
<td>10.3</td>
<td>2.3</td>
<td>14.3</td>
<td>2.8</td>
<td>14.8</td>
</tr>
<tr>
<td>Fluency Rating</td>
<td>3</td>
<td></td>
<td>2</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>
linked to the observer's impressions of fluency. Repair sequence data, which looks at the efficiency of clarification efforts, is presented in section 4.1.4.

4.1.1.2 Requests for Clarification in TOPICON Conversations

Table 4.2 displays Unsolicited and Solicited requests for clarification. The lone solicited request occurred at evaluation 2. The majority of requests were unsolicited and originated with S, and of those, the most frequently used by S, in all evaluations, were requests for confirmation of the message. This request type was the only type that was used in every evaluation conversation. The least frequently used were requests for elaboration and explanation.

<table>
<thead>
<tr>
<th>Evaluation</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unsolicited</td>
<td>S</td>
<td>D</td>
<td>S</td>
<td>D</td>
<td>S</td>
</tr>
<tr>
<td>Nonspecific</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>Specific Requests for:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repetition</td>
<td>3</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Confirmation-Message</td>
<td>16</td>
<td>1</td>
<td>8</td>
<td>-</td>
<td>11</td>
</tr>
<tr>
<td>Confirmation-Topic</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Elaboration/Explanation</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Solicited Requests</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Nonspecific</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Specific Requests for:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confirmation of Topic</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

86
The frequent use of Unsolicited Requests for Confirmation of Message indicates that S was initiating repairs and that he was either able to understand portions of the utterance, or that he was making reasoned guesses about what had been said.

In all the TOPICON conversations, Specific Requests outnumbered Nonspecific Requests. The widest variety of Specific Requests used by S occurred in the initial evaluation, before therapy began. The data fail to provide evidence that the therapy expanded the repertoire of S’s clarification requests. The data are limited but do show that S entered the program with a variety of clarification tools at his disposal, and that he used Specific Requests when able to do so. It is not surprising that he would use a variety of requests, since he has spent his life with a significant hearing loss and is an intelligent and able person who is, in many ways, a successful communicator.

The final two evaluations had the fewest number of clarification requests by both S and D. This may indicate better comprehension as a result of therapy. Alternately, it is possible that a growing familiarity with D or the particular topic of conversation account for the low number of repairs in these two conversations. Evaluation 4, with a total of three requests by S, had the fewest requests for clarification; it is reasonable to assume that this may have influenced the high Fluency Evaluation rating for this conversation.

At most five types of requests were used in any one conversation (Evaluation 1). In all evaluations, Requests for Confirmation of Message outnumber the next most frequently used request by at least a factor of two. The use of other request types does not conform to any pattern, other than a general reduction in number in the last two evaluations. This reduction does not correlate with the duration, number of turns, or to total number of clauses for either of these conversations.
4.1.1.3 Repair Strategies: TOPICON

The type of repair strategy used in a particular situation is related to the request for clarification, but the relationship is not one of strict cause and effect. The variety of repair strategies, illustrated in Table 4.3, (p. 89), exceeds the number of requests made. In some cases more than one type of repair strategy was employed in a request for clarification; for example, see evaluation 4, where three specific requests for clarification were made by S, but five different repairs were used by D.

The frequency of elicited repairs was much greater than unelicited repairs. This pattern, along with the infrequent unrepaired misunderstandings suggests that both participants were concerned with maintenance of understanding in the conversation.

The repair strategies used by S when D asked for clarification were not numerous -- a total of four in Evaluation 1 and five in Evaluation 5. The limited data restrict conclusions, but we can see that S uses more types of repairs in the final evaluation.

4.1.1.4 Repair Sequence Data: TOPICON

Table 4.4 presents data related to the clarification sequences that occurred in the TOPICON conversations. Turns and clauses, reported in the data, are defined in Chapter 3, Section 3.2 Coding of Conversational Fluency Measures. Chapter 3, Section 3.3, provides definitions of repair sequence measures. The repair sequences included all those instances in which clarification was required for S to understand what had been said. The repair sequence included the initial (or misunderstood) utterance and all subsequent utterances that were used to clarify the misunderstanding. A sequence may have required more than one request for clarification and/or clarification cue.
<table>
<thead>
<tr>
<th>Evaluation</th>
<th>ELICITED REPAIRS:</th>
<th>UNELICITED:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Exact Repetition</td>
<td>Exact Repetition</td>
</tr>
<tr>
<td></td>
<td>Partial Repetition</td>
<td>Partial Repetition</td>
</tr>
<tr>
<td></td>
<td>Elaborate/Explain</td>
<td>Elaborate/Explain</td>
</tr>
<tr>
<td></td>
<td>Syntactic Modification</td>
<td>Syntactic Modification</td>
</tr>
<tr>
<td></td>
<td>Confirmation</td>
<td>Confirmation</td>
</tr>
<tr>
<td></td>
<td>Paraphrase</td>
<td>Paraphrase</td>
</tr>
<tr>
<td></td>
<td>Spelling Cue</td>
<td>Spelling Cue</td>
</tr>
<tr>
<td></td>
<td>First Letter or Sound Cue</td>
<td>First Letter or Sound Cue</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>Total</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>S</th>
<th>D</th>
<th>S</th>
<th>D</th>
<th>S</th>
<th>D</th>
<th>S</th>
<th>D</th>
<th>S</th>
<th>D</th>
<th>S</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>7</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>--</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>14</td>
<td>17</td>
<td>1</td>
<td>21</td>
<td>5</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

89
TABLE 4.4 Repair Sequence Data: Turns, Clauses, Sequences and Repairs Made with One Cue in TOPICON Conversations

<table>
<thead>
<tr>
<th>Evaluation Session</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of turns in clarification sequences</td>
<td>62</td>
<td>36</td>
<td>49</td>
<td>11</td>
<td>36</td>
</tr>
<tr>
<td>Total number of clauses in clarification sequences</td>
<td>67</td>
<td>41</td>
<td>53</td>
<td>14</td>
<td>38</td>
</tr>
<tr>
<td>Total number of clarification sequences in the conversation</td>
<td>13</td>
<td>9</td>
<td>11</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Clarification sequences repaired with one cue</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Turns in clarification sequences to total number of turns in the conversation**</td>
<td>0.35</td>
<td>0.3</td>
<td>0.4</td>
<td>0.15</td>
<td>0.2</td>
</tr>
<tr>
<td>Clauses in clarification sequences to total number of clauses in the conversation*</td>
<td>0.25</td>
<td>0.17</td>
<td>0.26</td>
<td>0.08</td>
<td>0.13</td>
</tr>
</tbody>
</table>

** The total number of turns in clarification sequences divided by the total number of turns taken by both participants for that conversation. Section 4.1.1: Conversational Fluency Measures presents information that shows the number of turns and clauses in each TOPICON conversation.

* The total number of clauses in clarification sequences divided by the total number of clauses for both participants in the conversation. See Section 4.1.1 for number of clauses in each conversation.

Evaluation 4 is again noteworthy with respect to the low number and proportion of repair sequences. The overall fluency of the TOPICON conversation in evaluation four is apparent in the sparse allotment of conversational turns and clauses to clarification. The “ratio of clauses in clarification sequences to total clauses” in the final two evaluations shows that these two conversations devoted the smallest portion
of conversation to clarification efforts. The efficiency of clarification, as indicated by repairs made with one cue, shows a trend towards improvement in the last two evaluations with performance at evaluation 5 at 80% being the highest.

4.1.1.5 Verbal Protocol and Comprehension Questions: TOPICON

The final TOPICON measures were a series of questions asked as the verbal protocol and a set of comprehension questions that were based on content items introduced by D in the conversations. The general purpose of the questions was to sample S's perceptions and awareness of the conversation. Table 4.5 presents the results of the questions.

<table>
<thead>
<tr>
<th>Evaluation Session</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal Protocol Question</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How much did you understand?</td>
<td>7/10</td>
<td>8/10</td>
<td>7/10</td>
<td>6/10</td>
<td>8/10</td>
</tr>
<tr>
<td>How much effort was the conversation for you (S)? 1 to 10</td>
<td>5 or 6</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Who talked more?</td>
<td>D</td>
<td>D</td>
<td>Equal</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>Who asked more questions?</td>
<td>D</td>
<td>S</td>
<td>D</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>How much effort was the conversation for D? 1 to 10</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Comprehension Questions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent Correct</td>
<td>20%</td>
<td>40%</td>
<td>50%</td>
<td>40%</td>
<td>80%</td>
</tr>
</tbody>
</table>

Other than for evaluation 5 where there is a match of 8 and 80%, the estimates of how much S understood and his actual comprehension scores vary considerably. The effort for S to converse in each evaluation does not show a significant change over the
course of evaluations, and in most cases (with the exception of evaluation 2) he thought the effort for him was greater than for D.

S was correct in his assessment that D talked more and asked more questions than he did. One of the exceptions was evaluation 3 where he thought they both talked an equal amount, however, both clauses and clauses per turn indicate D talked more. The one thing that was close to being equal in the TOPICON conversation at evaluation 3 was the number of information questions asked by S and D, which were 12 and 11 respectively. S was also correct in his evaluation 2 judgement about questions; he did ask more questions (as he did in evaluation 3), the count was 17 vs 16. These were the only two conversations where S and D asked a similar number of information questions: in all other cases D asked considerably more.

It may be that the perceptions of the conversation held by S were strongly related to information exchanged by explicit questions as he seemed to be most aware of the questions asked in the conversations. The question-answer adjacency pair is a strongly entrenched conversational sequence, and the information extracted from a conversation by S may be closely correlated to information relayed in question-answer sequences. His overall comprehension of the conversation may be more closely tied to questions than to assertive statements made by D that introduced the information asked about in the comprehension questions. There was no standard manner, or control over they way in which the comprehension question information was introduced into the conversation.

4.1.2 Tracking Data

The sections below present the following data: tracking rates, requests for clarification made by S, clarification strategies used by CP, repair sequences information, and verbal protocol and comprehension question material.
4.1.2.1 Rates

The primary evaluative measures collected from tracking exercises were the rates, which are taken to be an index of the efficiency with which the sender and receiver are able to transmit information. Table 4.6 presents the tracking rates for both senders (CP and D) with narrative and descriptive texts and the noise conditions in which the procedure was done. All rates are reported in syllables per minute. The figures shown are the median and the interquartile range. The interquartile range is the distance between the first and third quartile rates. These rates were arrived at by determining the individual rate for each presentation segment of text and then calculating the rate for the median and quartile values of that text.

**TABLE 4.6 Tracking Rates: Median (and Interquartile Range) in Syllables per Minute**

<table>
<thead>
<tr>
<th>Evaluation Session</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sender CP</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Narrative Text</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65:Quiet</td>
<td>*</td>
<td>39.05</td>
<td>40.00</td>
<td>45.00</td>
<td>80.00</td>
</tr>
<tr>
<td>Interquartile Distance</td>
<td></td>
<td>(38.42)</td>
<td>(41.75)</td>
<td>(36.00)</td>
<td>(40.00)</td>
</tr>
<tr>
<td>Descriptive Text</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65:40</td>
<td>--</td>
<td>46.67</td>
<td>50.00</td>
<td>--</td>
<td>60.00</td>
</tr>
<tr>
<td>Interquartile Distance</td>
<td></td>
<td>(45.00)</td>
<td>(52.00)</td>
<td></td>
<td>(40.62)</td>
</tr>
<tr>
<td><strong>Sender D</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Narrative Text</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65:Quiet</td>
<td>31.81</td>
<td>24.00</td>
<td>35.00</td>
<td>26.67</td>
<td>45.00</td>
</tr>
<tr>
<td>Interquartile Distance</td>
<td></td>
<td>(37.64)</td>
<td>(26.84)</td>
<td>(26.53)</td>
<td>(30.71)</td>
</tr>
<tr>
<td>Descriptive Text</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65:Quiet</td>
<td>22.86</td>
<td>34.29</td>
<td>34.29</td>
<td>30.00</td>
<td>45.83</td>
</tr>
<tr>
<td>Interquartile Distance</td>
<td></td>
<td>(30.00)</td>
<td>(43.96)</td>
<td>(27.43)</td>
<td>(28.00)</td>
</tr>
</tbody>
</table>

* The initial narrative tracking was done in quiet conditions and had a rate of 67.01 syllables per minute. This item is not included in the series because of the different noise conditions, but is noted here because of the text type.

Note that no descriptive text with CP was done in sessions 1 and 3.
FIGURE 4.1 Tracking Rates in Syllables per Minute: Narrative and Descriptive Texts in Quiet and Noise with Senders CP and D

S and CP completed descriptive texts pre-therapy in evaluation session 2, mid-therapy in evaluation 3 and post-therapy in evaluation 5. It must be noted that the time interval in this condition was not constant.

In all conditions the rates increased from the initial to final evaluations. The greatest increase occurred with CP as sender using narrative texts. Table 4.7 shows the difference between the final and the initial rates (using an average of evaluation 1 and 2 pre-therapy rates, where available, to determine the initial rate).

Table 4.7 Tracking Rate Increases from First to Final Evaluation in Syllables per Minute for Senders CP and D

<table>
<thead>
<tr>
<th>Sender</th>
<th>Narrative Text</th>
<th>Descriptive Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>CP</td>
<td>41.0 syll/min.</td>
<td>13.33 syll/min.</td>
</tr>
<tr>
<td>D</td>
<td>17.1 syll/min.</td>
<td>17.08 syll/min.</td>
</tr>
</tbody>
</table>

94
The increases that occurred with D as sender were similar for both narrative and descriptive text (i.e. 17.1 and 17.08 syllables per minute). However, with CP as sender the increase in tracking rates for narrative text was substantially more than the increase for descriptive texts (41.0 syllables per minute compared to 13.33). The reason for the great difference in text types with CP as sender is not clear. There are three possible explanations:

1. there was only one pre-therapy descriptive text used by CP with which to establish the baseline in this condition;
2. the rate was initially high relative to the other conditions and it is possible there was less room for improvement;
3. only three descriptive texts in total were done and a practice effect that may influence other rates does not have a similar effect in this condition.

In considering the above possible explanations, it seems unlikely that the descriptive texts would be immune to a general practice effect, therefore the first two explanations appear to be more plausible. If the increases in rates for text types are averaged to provide a more general indication of improvement, then the average for CP is 27.4 syllables per minute increase across text types and 17.09 syllables per minute for D. As most words in the text were one to three syllables long these increases represent improvements in the range of nine to twenty-seven words per minute with CP and five to seventeen words per minute with D.

It cannot be ruled out that a portion of the increase in rates that occurred with both senders may be due to a practice effect and increasing familiarity with the tracking procedure. Increases in rates with D as sender may have also resulted as S and D became more familiar and at ease with each other. Another possibility that cannot be overlooked is that therapy provided to S and CP resulted in the increased rates. The effect of therapy on the rates is not entirely clear because the rates with both senders increased, however the general averaged increase accomplished by S
and CP exceeded that of S and D. While not conclusive, these data suggested that
therapy effects account in part for the increase over and above the increase achieved
by S and D. In order to determine the contributions of therapy to improved
efficiency the requests made by S and the repairs used by CP were analyzed to
determine if any changes were associated with therapy. In addition the repair
sequences involving both senders were compared to see if any changes in their
respective efficiency could be related to therapy. Sections 4.2.2, 4.2.3 and 4.2.4
present the results of these analyses.

4.1.2.2 Requests for Clarification by S in Tracking

Table 4.8 present the requests for clarification made by S with the different
tracking senders, first with therapy co-participant CP and then with D.

<table>
<thead>
<tr>
<th>Evaluation Session</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>SENDER CP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Narrative Text</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonspecific Requests</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Specific Requests</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Descriptive Text</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonspecific Requests</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Specific Request for:
Partial Repetition    | 1 | --| --| --|   |
| Confirmation         | 2 | --| --| --|   |
Table 4.8 Requests for Clarification Made by S continued:

<table>
<thead>
<tr>
<th>Evaluation Session</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SENDER D</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Narrative Text</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonspecific Requests</td>
<td>3</td>
<td>2</td>
<td>11</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Specific Requests for:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partial Repetition</td>
<td>2</td>
<td>--</td>
<td>1</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Confirmation</td>
<td>1</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td><strong>Descriptive Text</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonspecific Requests</td>
<td></td>
<td></td>
<td>2</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Specific Requests for:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partial Repetition</td>
<td></td>
<td></td>
<td>--</td>
<td>--</td>
<td>2</td>
</tr>
</tbody>
</table>

*Not done means that text type not done in that session or not included in the data.

The transcripts of tracking showed frequent and extended repair sequences. In contrast, the requests for clarification by S were very infrequent. Attempts at repeating or correctly repeating the presentation segment were not counted as clarification requests by S as they were a part of the tracking procedure and therefore not discernibly different from clarification requests that ask for full or partial repetition. It can be concluded from this data that use of clarification requests by S during the tracking exercise did not change with therapy, and therefore cannot account for changes in tracking rates.

4.1.2.3 Repair Strategies Used by CP: Tracking

Tracking rates improved for S and CP (who received therapy) on average almost ten syllables per minute more than the rate increase for S and D (who did not receive therapy). These data suggested that therapy may account for the improvement shown by S and CP over and above the improvement shown by S and D. This section
examines the repair strategies used by CP to see if better use of repair strategies can account for the observed increases. The data is presented in Table 4.9 below.

**TABLE 4.9 Repair Strategies Used by CP in Tracking as Percent of All Strategies Used**

<table>
<thead>
<tr>
<th>Evaluation Session</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NARRATIVE TEXT</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exact repetition</td>
<td>44.4%</td>
<td>3.1%</td>
<td>10.6%</td>
<td>22.2%</td>
<td></td>
</tr>
<tr>
<td>Partial repetition</td>
<td>46.3%</td>
<td>53.8%</td>
<td>58.7%</td>
<td>44.4%</td>
<td></td>
</tr>
<tr>
<td>Paraphrase</td>
<td>1.9%</td>
<td>1.5%</td>
<td>6.7%</td>
<td>5.6%</td>
<td></td>
</tr>
<tr>
<td>Elaborate/explain</td>
<td>--</td>
<td>0.8%</td>
<td>2.9%</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Modify syntax</td>
<td>7.4%</td>
<td>18.5%</td>
<td>11.5%</td>
<td>27.8%</td>
<td></td>
</tr>
<tr>
<td>Confirmation</td>
<td>--</td>
<td>2.3%</td>
<td>2.0%</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Spell</td>
<td>--</td>
<td>16.9%</td>
<td>0.9%</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>1st sound/letter</td>
<td>--</td>
<td>3.1%</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Metagrammatical</td>
<td>--</td>
<td>--</td>
<td>0.9%</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Syllable</td>
<td>--</td>
<td>16.9%</td>
<td>5.8%</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td><strong>Total number of cues</strong></td>
<td>54</td>
<td>130</td>
<td>104</td>
<td>18</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>DESCRIPTIVE TEXT</strong></th>
<th>not done*</th>
<th></th>
<th>not done*</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Exact Repetition</td>
<td>20.0%</td>
<td>27.5%</td>
<td>26.8%</td>
<td></td>
</tr>
<tr>
<td>Partial Repetition</td>
<td>62.5%</td>
<td>62.7%</td>
<td>53.6%</td>
<td></td>
</tr>
<tr>
<td>Paraphrase</td>
<td>0.8%</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Modify syntax</td>
<td>15.9%</td>
<td>9.8%</td>
<td>12.5%</td>
<td></td>
</tr>
<tr>
<td>Confirmation</td>
<td>0.8%</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Syllable</td>
<td>--</td>
<td>--</td>
<td>7.1%</td>
<td></td>
</tr>
<tr>
<td><strong>Total number of cues</strong></td>
<td>120</td>
<td>51</td>
<td>56</td>
<td></td>
</tr>
</tbody>
</table>

*Not done means that text type not done in that session or not included in these data*
The number of repair cues shows considerable variation, with a low of 18 in the narrative condition at evaluation 5 to a high of 130 in the narrative condition at evaluation 3, closely followed by 120 in evaluation 2 descriptive condition. The low number of cues used in the narrative condition at evaluation 5 may have limited the distribution and variety of cues used in that text. Evaluation 3 and 4 narrative conditions show the greatest diversity of cues. The increased diversity in these evaluations appears to be at the expense of the “Exact repetition” category which was used less often; the other favoured category “Partial Repetition” is fairly constant, while “Paraphrase” and “Modify syntax” make gains in later evaluations. This confirms comments made by CP who thought that at the outset of the program she did little more than repeat when S did not understand her, and that by the end she knew of other ways to help her brother to understand.

The situation with descriptive text was somewhat different than with the narratives: CP used a greater variety of repair cues in evaluation 2, before therapy began, and relative proportions did not show the same amount of change as they did with the narratives. It is possible that text characteristics limit the opportunity to use some repair cues, but it is not readily apparent in what ways, or why this would be so. The noise conditions of later narrative text tracking may also be a factor, but it is not clear then, why performance in the narrative condition at evaluation 5 would differ from evaluations 3 and 4 given that all were conducted in the same noise condition. Other possible factors affecting the choice of repair cues used may be more closely related to individual text characteristics, rather than to noise conditions or text genre.

The repair strategies used by CP showed a greater diversity after therapy began. While it is not possible with these data to directly link increased rates in tracking to the use of a wider variety of repair strategies by CP, it is highly probable that they
did contribute to more efficient clarification and faster tracking rates.

4.1.2.4 Repair Sequence Data: Tracking

Examination of the clarification requests and repair cues does not give obvious clues as to why tracking rates changed. For example, an expanded repertoire might speed up clarification, but the texts for which the highest rate were observed were not simply the ones with the most types of requests or repair cues. Another way to consider the effect that repairs had on tracking performance was to find out if there were any changes in the number or proportion of repairs that were completed with one cue from the sender. That is, were the cues becoming more effective? Were the right ones being used at the right time? In making this evaluation the information below was considered. The reader is referred back to Chapter 3 Analysis for a more complete definition of the categories.

a) average length in syllables of presentation segments: the average length of presentation segments sent by the sender.

b) the number of initial correct responses: the segments of text presented by the sender that were correctly repeated without need for repair.

c) the proportion of segments that were corrected with only one repair cue: the number of text segments repaired with one cue divided by the number of text segments requiring repair.

d) combined initial correct response with repairs made with one cue: the total number of initial correct responses plus the number repaired with one cue divided by the total number of segments in the text.

Table 4.10 (p. 101) presents the data for CP as sender and Table 4.11 (p. 102) the data for D as sender. The measures of frequency are shown on the tables as a ratio (and the ratio expressed as a percentage).
TABLE 4.10 Repair Sequence Data for CP in Tracking: Length of Presentation Segment, the Ratio (and percentage) of Initial Correct Responses, Segments Repaired with One Cue and the Rate of the Initial Correct + Repaired with One Cue

<table>
<thead>
<tr>
<th>SENDER CP</th>
<th>Evaluation Session</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Narrative Text</td>
<td></td>
<td>7.34</td>
<td>not done*</td>
<td>4.8</td>
<td>4.98</td>
<td>6.63</td>
</tr>
<tr>
<td>Length in Syllables</td>
<td></td>
<td>7.34</td>
<td>not done*</td>
<td>4.8</td>
<td>4.98</td>
<td>6.63</td>
</tr>
<tr>
<td>Initial correct response</td>
<td></td>
<td>13/47 (27.7%)</td>
<td>27/67 (40.3%)</td>
<td>38/70 (54.3%)</td>
<td>46.60 (76.7%)</td>
<td></td>
</tr>
<tr>
<td>Correct with 1 repair cue</td>
<td></td>
<td>14/34 (41.2%)</td>
<td>18/40 (45%)</td>
<td>12/32 (37.5)</td>
<td>11/14 (78.6%)</td>
<td></td>
</tr>
<tr>
<td>Initial correct + corrected with 1 cue</td>
<td></td>
<td>27/47 (57.4%)</td>
<td>45/67 (67.1%)</td>
<td>50/70 (71.4%)</td>
<td>57/60 (95%)</td>
<td></td>
</tr>
<tr>
<td>Descriptive Text</td>
<td></td>
<td>not done</td>
<td>7.24</td>
<td>6.29</td>
<td>not done</td>
<td>4.57</td>
</tr>
<tr>
<td>Length in syllables</td>
<td></td>
<td>not done</td>
<td>7.24</td>
<td>6.29</td>
<td>not done</td>
<td>4.57</td>
</tr>
<tr>
<td>Initial correct response</td>
<td></td>
<td>30/84 (35.7%)</td>
<td>24/54 (44.4%)</td>
<td>64/92 (69.9%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correct with 1 repair cue</td>
<td></td>
<td>23/54 (42.6%)</td>
<td>14/30 (46.7%)</td>
<td>15/28 (53.6%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial correct + corrected with 1 cue</td>
<td></td>
<td>53/84 (63.1%)</td>
<td>38/54 (70.1%)</td>
<td>79/92 (85.9%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Not done means that text type not done in that evaluation
<table>
<thead>
<tr>
<th>SENDER D</th>
<th>Evaluation Session</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Narrative Text</td>
<td>Length in syllables</td>
<td>8.17</td>
<td>not done*</td>
<td>7.09</td>
<td>7.88</td>
<td>8.34</td>
</tr>
<tr>
<td>Initial correct responses</td>
<td>10/40 (25%)</td>
<td>13/54 (24.1%)</td>
<td>5/50 (10%)</td>
<td>28/89 (35.6%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repaired with one cue</td>
<td>14/30 (46.7%)</td>
<td>11/41 (26.8%)</td>
<td>15/45 (33.3%)</td>
<td>27/67 (44.3%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial correct + corrected with one cue</td>
<td>24/40 (60%)</td>
<td>24/54 (44.4%)</td>
<td>20/50 (40%)</td>
<td>55/89 (61.8%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Descriptive Text</td>
<td>Length in syllables</td>
<td>not done</td>
<td>5.46</td>
<td>6.18</td>
<td>not done</td>
<td>7.91</td>
</tr>
<tr>
<td>Initial correct responses</td>
<td>29/69 (42%)</td>
<td>20/65 (30.8%)</td>
<td>26/73 (35.6%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repaired with one cue</td>
<td>16/40 (40%)</td>
<td>15/45 (33.3%)</td>
<td>19/47 (40.4%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial correct + corrected with one cue</td>
<td>45/69 (65.2%)</td>
<td>35/65 (53.8%)</td>
<td>45/73 (61.6%)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Not done means that text type was not completed at that evaluation session
Examination of Table 4.10 shows that the average length of the text segments that CP presented tended to become shorter over the course of evaluations. The first two evaluations had the longest presentation segments. The trend towards reduced lengths is not steady, as performance in the narrative condition at evaluation 5 showed an increase of about 1.5 syllables over the immediately preceding narrative. On a before and after therapy basis, a general reduction is apparent once therapy started.

Both the initial correct responses and the segments repaired with one cue showed increases, but initial correct responses showed the greater gains over the course of evaluation: and increase of about 49%. They presumably contribute in the greater part to the increases shown in the combined category (i.e. initial correct responses plus segments repaired with one cue).

In narratives with D as sender the mean length in syllables varied little more than 1 syllable over the course of evaluations and by less than one syllable from start to finish. In descriptive text the mean increased by over 2 syllables. We can conclude that shorter presentation segments were not a strategy used by D to make it easier for S to understand the text, while they may have been a strategy used by CP.

Initial correct responses in narrative text with D as sender improved by about 10.6 percent from evaluation 1 to 5, but were sporadic over the course. The rate in descriptive text with D dropped. One cue repairs decreased in narrative text and fluctuated in descriptive text and resulted in virtually no change from the first to last evaluation. The results were that with D as sender the overall combined rate did not improve.

The graphs below show the changes in repair sequence data over the course of evaluations. The first graph compares the data for Narrative texts with CP and D as sender. The second graph is for Descriptive text.
FIGURE 4.2 Text Segments Repaired with One Cue and Segments Repaired with One Cue plus Initial Correct Responses for Narrative Text with Senders CP and D

*CP-1 repair cue  CP-Combined*  D-1 repair cue  D-Combined*

FIGURE 4.3 Text Segments Repaired with One Cue and Segments Repaired with One Cue Plus Initial Correct Responses for Descriptive Text with Senders CP and D

*CP-1 repair cue  CP-Combined  D-1 repair cue  D-Combined*

*Combined means “combined initial correct responses and repaired with one cue”.

104
In summary, this analysis showed that CP generally reduced the length of presentation segment after therapy began, while D did not. The rates at which CP and S completed initial correct responses and made repairs with one cue improved, while the same rates for D and S did not improve. This data supports the assumption that therapy helped CP by helping her to be more able to convey precise information to S. The improvement appears to have come about by the presentation of shorter (and perhaps more manageable) text segments and by improved efficiency in making repairs.

4.1.2.5 Verbal Protocol and Comprehension Questions - Tracking

Following each tracking session S first answered a number of written multiple choice questions based on information contained in the text and then was asked a series of questions from the Verbal Protocol. The information question results are reported below in Table 4.12, and Verbal Protocol answers are displayed in the Table 4.13.

TABLE 4.12 Percentage of Tracking Comprehension Questions Answered Correctly

<table>
<thead>
<tr>
<th>Evaluation Session</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SENDER CP</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Narrative</td>
<td>60</td>
<td>87.5</td>
<td>75</td>
<td>71</td>
<td>71</td>
</tr>
<tr>
<td>Descriptive</td>
<td>--</td>
<td>40</td>
<td>43</td>
<td>--</td>
<td>75</td>
</tr>
<tr>
<td><strong>SENDER D</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Narrative</td>
<td>86</td>
<td>40</td>
<td>71</td>
<td>40</td>
<td>70</td>
</tr>
<tr>
<td>Descriptive</td>
<td>86</td>
<td>100</td>
<td>100</td>
<td>40</td>
<td>50</td>
</tr>
</tbody>
</table>
TABLE 4.13 Verbal Protocol: Estimates of Comprehension and Effort in Tracking

**Estimate of Comprehension on a 1 to 10 scale (poor to good)**

<table>
<thead>
<tr>
<th>Evaluation Session</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Narrative Text</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sender: CP</td>
<td>8</td>
<td>5</td>
<td>5</td>
<td>8</td>
<td>7-8</td>
</tr>
<tr>
<td>Sender: D</td>
<td>7</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td><strong>Descriptive Text</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sender: CP</td>
<td>-</td>
<td>5</td>
<td>5</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>Sender: D</td>
<td>4-5</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>6-7</td>
</tr>
</tbody>
</table>

**Estimate of Effort on a 1 to 10 scale (little to great)**

<table>
<thead>
<tr>
<th>Evaluation Session</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Narrative Text</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sender: CP</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Sender: D</td>
<td>6</td>
<td>7</td>
<td>5</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td><strong>Descriptive Text</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sender: CP</td>
<td>--</td>
<td>6</td>
<td>6</td>
<td>--</td>
<td>6</td>
</tr>
<tr>
<td>Sender: D</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

Comprehension of tracking texts, as indicated by the percentage of questions answered correctly, did not change as a function of the therapy provided. The data does not provide any definitive reasons for the variations that occurred, but differences in correct answers may include individual text differences, or aspects of the questions (wording, specificity of information required, etc.). In addition, the estimates of comprehension made by S in the verbal protocol do not correspond to actual scores on the questions, nor do they evidence any systematic change in degree.
of accuracy. We can conclude that in the tracking exercises the subject’s comprehension and awareness of what he understood did not change as a result of therapy.

The comprehension questions were asked in order to encourage and measure comprehension, rather than simply allow the receiver to repeat the text without attempting to follow the content. From these results we can assume that either S chose not to closely track meaning, or that the demands were too great and he was unable to do so. As he was a willing, intelligent and enthusiastic participant the latter seems more probable. S reported that a strategy he used to help him repeat the text was that he “stuck to the theme” or idea of the story. However, he had to contend with frequent and extended clarification sequences that segmented the text material and disrupted a smooth flow of text information.

S was asked, as a regular part of the Verbal Protocol, to rate the level of effort involved for him in each of the tracking and TOPICON evaluation procedures. His ratings were made on a 1-10 scale, with 1 being “easy” and 10 “difficult”. The ratings S made do not show any change directly attributable to the therapy program or amount of therapy time. In a matched comparison between senders, S generally found tracking easier with CP than with D.

4.2 SUBJECTIVE EVALUATION MEASURES

4.2.1 Hearing Performance Inventory

The Hearing Performance Inventory questionnaire was completed by S before he began therapy, and then again two weeks after the conclusion of therapy. The questionnaire asks questions or makes statements about a persons ability to hear speech or sounds in various everyday situations.

S was asked to answer questions using the following scale to express how often he
experienced the situation described in the questionnaire:

1- Practically always .................. (or always)
2- Frequently ............................ (about three-quarters of the time)
3- About half the time .................. (about half the time)
4- Occasionally ........................... (about a quarter of the time)
5- Almost Never .......................... (or never)

The questions were phrased and scored so that a lower score indicated a better ability to comprehend speech or hear sounds. The questionnaire consists of 131 self report questions that can be grouped into subsets that provide a profile of different situations and hearing related abilities. Scores were calculated for thirteen subtests, and provide an index of S's reported hearing performance before and after therapy in the following areas:

1. Int - hearing performance in conditions of different sound intensity;
2. Soc - hearing performance in social situations;
3. Pers - personal attitudes about hearing loss;
4. Raf - response to auditory failure or how a person responds to not hearing;
5. Speech - hearing performance as it relates to hearing speech;
6. Vis - communication when it is possible to see the other person;
7. Novis - communication when it is not possible to see the other person;
8. Oneone - communication in a one to one situation;
9. Many - communication with many persons at one time;
10. Familiar - communication with familiar persons;
11. Stranger - communication with strangers;
12. Quiet - communication in quiet conditions;

The following chart presents the scores from both of the HPI questionnaires answered by S. The scores were arrived at by determining the mean of all applicable question responses in each of the subtests. A score of 1 indicates little handicap and
a score of 5 indicates great handicap.

TABLE 4.14 Responses on Thirteen Subtests of the Hearing Performance Inventory by S Before and After Therapy

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Int</th>
<th>Soc</th>
<th>Pers</th>
<th>Speech</th>
<th>Raf</th>
<th>Vis</th>
<th>Novis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before therapy</td>
<td>2.778</td>
<td>3.824</td>
<td>2.750</td>
<td>4.000</td>
<td>3.097</td>
<td>3.633</td>
<td>5.000</td>
</tr>
<tr>
<td>After therapy</td>
<td>3.056</td>
<td>3.540</td>
<td>2.125</td>
<td>4.029</td>
<td>2.793</td>
<td>3.551</td>
<td>5.000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Oneone</th>
<th>Many</th>
<th>Familiar</th>
<th>Stranger</th>
<th>Quiet</th>
<th>Noise</th>
</tr>
</thead>
<tbody>
<tr>
<td>After therapy</td>
<td>3.865</td>
<td>4.200</td>
<td>3.500</td>
<td>4.455</td>
<td>4.043</td>
<td>4.280</td>
</tr>
</tbody>
</table>

S’s answers to the questions indicated considerable handicap in all conditions. The changes in results showed that there was improvement in seven of the thirteen subtest areas. There was no change or very little change (i.e. <0.05 difference) in four subtests and higher scores, suggesting increased problems, in two subtests. The two areas with higher scores were “Intensity” and “Speech in quiet”; it is not clear why there should be more problems after therapy, but the results may indicate an increased awareness of problems in those areas. It is also possible that performance did worsen, possibly because S was beginning to concentrate on other aspects of communication that were introduced in therapy, though it is not apparent why this should happen.

The greatest improvements were registered in the “Personal attitudes”, “Response to auditory failure” and “Social situations” categories. These results, if viewed as part of a composite picture, suggested that the therapy program may have helped S by improving the way that he communicated in social situation. One may assume that this is directly related to conversation given that conversation is a social as well as communicative event. Furthermore it may be surmised that the improvement is
related to a change in attitude toward hearing loss and the way in which he resolved communication breakdown. It is interesting to note that improved performance was reported on speech in noise conditions, in contrast to the poorer performance on speech in quiet. This suggests that in noise, where it is harder for S to perceive what has been said, he was able to rely on comprehension strategies discussed in therapy to compensate for reduced fidelity of the speech signal.

4.2.2 Interview

Following the completion of therapy and evaluation sessions S and CP were interviewed and asked to complete a questionnaire devised by the investigator. They were seen individually to discuss the program. Their parents were interviewed separately. The interviews took place in their home.

At the final evaluation session S and CP were given copies of the questions, which they responded to in writing, and which were used as a basis for discussion in the interview. The intention of the questions was to provide information in three program related areas: use, benefit, and satisfaction. (See Appendix 4 for a copy of the questions given to S and CP).

4.2.2.1 Use

One can assume that the use of program information in real life communication situations indicates that the program has application outside the clinic. Evidence of continued use reinforces this indicator, and suggests also that some benefit, or usefulness, is being derived.

S reported that there had been occasions where he used some of the strategies and information discussed in therapy sessions. He provided details about two separate events during which he practiced the conversation skills learned in therapy. One
event was a youth group trip to Denver and the other a wedding that his family attended. In both cases he reported that he tried to place himself in the best position to speechread and that he tried to judge facial expressions so that he could better understand the conversation. In addition, he said he was aware of conversational sequences that helped him to follow the conversation, and that when he missed information he asked the other individuals to “fill him in or repeat themselves.” He also reported that an increased awareness of language structure helped him “phrase a question specifically” or guess what part of a sentence he missed.

At the wedding reception S reported that he had taken the initiative to introduce himself to the groom and introduced the topic on which they spoke. This helped him begin the conversation and have some expectations about the content of the conversation. He introduced himself to strangers at the wedding and reported that his awareness of conversational structure helped him to carry on conversations, and that “learning what to look for and (knowing) how to put myself in the picture again has been helpful”.

CP reported that she noticed a “large change” in the way S participated in conversations. She said that S did not specifically ask her for help in conversations more often, but on the other hand, she was aware that when he had difficulty he looked at her “for a cue, or to fill him in.” She thought he seemed more confident and willing to converse, especially with strangers. In her opinion this new confidence “enabled him to ask someone to repeat something, or asked someone to speak more slowly,” which she had witnessed him doing on the bus trip their youth group took.

For her part, CP believed that her conversations with her brother had changed. She reported “I have definitely used the skills I have been taught to make a conversation easier for (S) to follow”. As examples, she said she now had different ways to help him understand a word. Specifically she said she would find another word close in meaning, or would be careful about how she structured what she said,
rather than simply repeating, as she had usually done before the therapy program. She also reported discussing the program at home with the other family members, and felt that the whole family was "more aware" as a result.

During their group trip to Denver, CP reported that she noticed S was managing to communicate and get along well within the group. At one point they were making arrangements to meet at a particular place, and CP relied on some of the things she had learned in the program; specifically, she identified critical information which was the street name, spelled out the name and asked S to confirm by repeating that he had in fact understood the information. She attributed her awareness of potential communication problems and use of these strategies to her involvement in the program.

S's parents believed that the program had been useful for the whole family. They reported that S was now more outgoing and assertive in conversations. They offered the example of the wedding, where they observed S engaging in numerous conversations with unfamiliar people, something that he would not have done prior to the program. They were sure that the program had been of immediate use to S and his father had observed that S had begun "more intelligent questioning, and thinking more about the subject matter" of conversations.

4.2.2.2 Benefit

S reported that he thought the program had benefited him by improving his ability to communicate. On a scale of 1 to 10 (little to great) he rated the benefits at 8. He thought that he took part in conversations more than he had before, that it was now easier for him to have a conversation, and that he now understood more in conversations than he had before. He reported that the changes came about, in part, because he had become "more assertive and aware of (his) need to participate in a conversation."

112
CP identified two important benefits for herself that came from involvement in the program: she thought she was now more patient and understanding of her brother's communication difficulties, and that she was better able to communicate effectively. She rated the benefits of the program at 8, on a 1 to 10 scale. CP thought her increased empathy was due to therapy activities involving the HELOS, where she experienced a simulated hearing loss. Her improved ability to communicate effectively came from knowing how "to make a conversation easier for (S) to follow", and from knowing a variety of ways to make clarifications. She thought her brother benefited by being more confident and at ease in conversations, especially with strangers.

The same observations were made by S and CP's parents. They were most impressed by the change in attitude shown by S. His mother thought that he had become more assertive and able, not only to get involved in conversations with unfamiliar people but, to make sure that he understood critical information, even if it required asking for some sort of clarification. She thought that one of the reasons for his new attitude might be that he had been able to externalize his problems -- that an analytic approach to solving communication problems suited his personality and that it had helped him to recognize that his communication problems resulted from his hearing loss and not from some personality flaw.

4.2.2.3 Satisfaction

All family members interviewed said they were extremely satisfied with the results of the program. S rated his satisfaction with how much he understood in conversations at 8, on a 1 to 10 scale and said that this level of understanding had improved as a result of his involvement. He rated his overall satisfaction with the program at 9. The overall rating given the program by CP was 9, and her satisfaction rating for conversations she had with her brother was 8 to 9. She judged that before
the program she would have rated the conversations at about 6.

S's parents also expressed satisfaction with changes that they had observed. They expected that the results they had seen were a beginning, and that the skills they had all acquired could be built on for future improvements. His mother reported that she had previously felt that she was the primary advocate for S, but that now the entire family, through discussions and reading program material, was more aware of his communication needs. They were optimistic about future prospects and satisfied with the direction that the program had given S and the rest of the family.

4.3 SUMMARY OF RESULTS

The key findings of the objective and subjective evaluation measures used in this study are summarized in this section.

4.3.1 Objective Measures

The TOPICON conversation at evaluation 4 was judged to be the most fluent conversation. There was not a strong connection between judgements of fluency and the fluency measures that were used to analyze the conversations. The final two TOPICON conversations had the fewest number of clarification requests and were the most efficient in making repairs. Of all the conversations they devoted the smallest portion of turns and clauses to clarification sequences. These results indicated that therapy may have improved S's ability to repair conversation breakdowns efficiently and that, while this may contribute to impressions of conversational fluency, the objective measures did not show that conversations became more fluent.

Tracking rates increased overall with both senders. The averaged increase for CP, who participated in therapy, was greater than the increase for D. The rate increase over and above that shown by S and D was assumed to be related to the therapy that CP had received. The type or frequency of clarification requests used by S did not
show any changes or connection to therapy. CP, on the other hand, began using more kinds of repair strategies after she started therapy. Over the course of the tracking sessions the length of the text segments presented by CP showed a general reduction and the proportion of segments that were repeated correctly, as well as those segments repaired with one cue increased. These effects were not observed with D as sender. These data indicated that therapy had benefited CP by giving her more repair strategies and that she had become more efficient in conveying information to S. The efficiency relied primarily on reduced length of the presentation segment and on efficient repairs.

4.3.2 Subjective Measures

Seven of the thirteen HPI subtest showed improvement after therapy. The greatest improvements occurred in the subtests concerned with personal attitude to hearing loss, social situations and response to auditory failure. It was hypothesized that these areas showed improvement because enhanced conversations result in enhanced social exchanges and because therapy increased S's ability to repair conversations when he did not understand something. Indication of poorer performance in the areas of hearing in quiet conditions and in situations where sound intensity levels are reduced are not readily explained.

In the interview S and CP reported that they both had found the therapy program useful. S said that he had learned skills and had been given information that made him more able to understand and participate in conversations. CP reported that she had learned to anticipate problems and repair conversations better as a result of the program. CP and her parents indicated that they believed an important benefit of therapy had been that S had developed a new confident attitude towards conversation. Reports from S indicated the same. All the family were extremely satisfied with the therapy program.
CHAPTER 5
CONCLUSION AND DISCUSSION

5.1 GOALS of STUDY

This study was undertaken to evaluate an aural rehabilitation program that incorporated the methods described by Erber in *Communication Therapy for Hearing Impaired Adults* (1988). The research was concerned with three different areas of program evaluation:

1. an evaluation of the benefits derived from therapy by a hard-of-hearing subject and a communication partner;
2. an evaluation of program delivery based on a comparison of benefits associated with four hours and with eight hours of therapy;
3. an examination of the evaluation methods used in the study.

Erber assumes that information pertaining to how language is used in conversation can be employed in aural rehabilitation to increase a client's knowledge of language structure and usage. This knowledge can then be used in strategies that allow the individual to participate more fully in conversations. Erber recognizes that conversation is interactive and assumes that benefits can be derived by also providing therapy to a person who frequently communicates with the hard-of-hearing client.

In order to judge these assumptions the following hypotheses, restated here from chapter 1, were tested:

1. This therapy approach will be of benefit to a client by improving his ability to understand conversations better and thereby to be a more efficient and fluent communicator. Benefit will be observable in the following areas:
   a. increases in the amount of conversation understood;
b. increases in the efficiency of communication, where efficiency is taken to be the rate at which information is conveyed;

c. improved fluency of conversations, where fluency is taken to be an impression based on the coherence and efficiency of conversation;

d. improvement in the ability to repair conversational dysfluencies;

e. satisfaction with the ability to have conversations and to use the strategies trained in the therapy in different situations and contexts.

2. As a result of therapy, a communication partner should exhibit an increased awareness of the communication difficulties experienced by a hard-of-hearing individual and become more efficient in relaying information to a person in conversation. She should be satisfied that their conversations together are more fluent and efficient. Changes should be observable in the following measures:

a. improvement in performance on efficiency related measures;

b. improvement in the ability to effect conversational repairs;

c. satisfaction on subjective measures that gauge benefit from therapy.

3. Changes in conversation related to therapy can be measured. A study that measures changes in a series of evaluations at regular intervals of time will indicate if benefits are related directly to the number of therapy hours and, in particular, if eight hours of therapy provides significantly more benefit than four hours.

4. The evaluation measures that are available for use in the study of communication provide a composite assessment of conversation ability. Both objective and subjective measures will indicate benefit if it occurs. Critical examination of the various evaluation methods should indicate the proper
application for each method when used in the evaluation of conversation based communication.

5.2 SUMMARY OF RESULTS

This section will provide a brief summary of the major results of the present study, organized according to the objective or subjective nature of the measures that were employed. Subsequent sections will then present the data that supports or refutes each of the stated hypotheses.

5.2.1 Objective Measures: TOPICON

Objective evaluation measures provided information with which to examine conversational fluency and comprehension of conversation. These will be considered in turn for both the TOPICON and for the tracking exercises.

Data collected using the TOPICON procedure were used to examine conversational fluency by means of the proposed fluency evaluation measures and by looking at the repair sequences that occurred during the conversations. The TOPICON conversation at evaluation 4 was judged by an outside speech-language pathologist to be the most fluent. It was characterized by relatively few topic initiations or shifts and had the highest ratio of clauses to turns, indicating that S and D maintained topics well and used their turns to contribute information content.

The first and the final TOPICON conversations were judged as equally fluent, but less fluent than the conversation at evaluation 4. The second and third evaluation conversations were judged as the least fluent. There was not a strong relationship between these overall judgements and measures that itemized proposed elements of conversational fluency, nor was there systematic improvement in these measures over the course of the evaluations.

The final two conversations had the fewest clarification requests overall. Analysis
of conversational repair sequences showed that S and D made repairs most efficiently in these conversations. They devoted the smallest portion of the conversation, in terms of proportion of turns and clauses, to that purpose.

The assessment of comprehension by means of content question scores did not correlate to judgements of fluency, but they did show an increase from initial to final evaluation (i.e. 20% correct in evaluation 1 and 80% in evaluation 4).

5.2.2 Objective Measure: Tracking

Tracking rate scores were calculated as a measure of the efficiency of transmission of information from the sender to the receiver. Efficiency in communication is one of the proposed elements of Erber's construct of conversational fluency (1988; p. 188). Transcripts of tracking conversations were also analyzed to determine if CP's increased rates were due to improved use of clarification cues and to compare CP and D's repair sequences.

Results showed that rates increased overall, with both CP (who received therapy) and with D (who did not receive therapy) as senders. However, CP's rates were higher than D's and showed a higher average increase (i.e. the average increases of both descriptive and narrative text combined). Furthermore, examination of the transcripts showed that CP expanded her repertoire of clarification cues after she started therapy. Examination of the clarification sequences showed that CP reduced the length of the segments that were presented across evaluations. In addition, the rate at which S repeated segments of text correctly on first presentation and the rate at which CP accomplished repairs with one cue increased over the course of evaluation. These effects did not occur with D as sender. This difference was considered to be an important reason why CP and S's rates increased more than D and S's.

Comprehension questions based on text information were asked after each
tracking session. S's scores on comprehension questions fluctuated over the course of evaluation and could not be attributed to the onset or amount of therapy. This indicated that comprehension did not improve in tracking as a result of therapy.

5.2.3 Subjective Measure: Hearing Performance Inventory

The Hearing Performance Inventory (HPI) is a questionnaire that asks 131 questions about an individual's hearing performance in different situations. The test questions can be grouped into different subtests that identify specific situations or conditions. The two HPIs that S completed were scored for 13 different subtests. Results showed improved performance in seven areas, no change or very little change (i.e. <0.05 change) in four areas, and poorer performance in two areas. Greatest improvement occurred in subtests pertaining to personal attitude, response to auditory failure, and social situations. Poorer performance occurred in subtests asking about conversations in quiet conditions and situations where sound intensity levels are reduced.

5.2.4 Subjective Measure: Interview

S, CP and their parents were interviewed separately to ask about their impressions of the therapy program and specifically to determine if the program was of use in everyday situations, what benefits they derived, and their level of satisfaction with the program. Both S and CP thought that the program had given them information that they used in conversation. They were able to provide examples of how they had used program information while on a youth group trip and while the family attended a wedding. S reported that he used his knowledge about conversation sequences and language structure to help him understand conversation. He also reported that he had been able to formulate better clarification questions as a result of therapy. CP reported that she had begun to use more efficient communication practices and
clarification cues with S. Their parents thought that S had begun to use more intelligent questions.

S believed he had benefited by being better able to understand conversation and to get clarification when needed, and by becoming more aware and assertive in communication. CP believed that she had benefited by becoming more aware of S's communication problems and by being better able to anticipate and repair misunderstandings. Their parents thought that the greatest benefit was shown in S's new confident attitude. They judged that he had also benefited by being able to externalize his communication problem so that he was able to think of it in analytic terms rather than as a personal failing.

S, CP and their parents were all extremely satisfied with the program. S and D both rated their satisfaction at 9 on a 1 to 10 scale, where 10 is total satisfaction.

5.3 EXAMINATION of HYPOTHESIS

In this section the results will be considered in the context of the hypotheses in order to determine the extent to which the hypotheses are supported by the research findings. The hypotheses will be considered in turn on a point by point basis. The results will again be considered with reference to both the objective and the subjective measures.

5.3.1 Hypothesis 1: Benefit Provided to the Hard-of-hearing Subject

It was hypothesized that subject benefit would be evident in the following areas:

a. Increases in the amount of conversation understood:

Objective measures did not provide strong evidence to support this hypothesis. Comprehension questions gave equivocal evidence. Question scores for the material used in the tracking exercises varied without correlation to therapy, while scores on TOPICON material showed improvement in the last evaluation session. The results measured for the TOPICON exercise are confusing because the actual comprehension
scores did not correspond to S’s estimation of how much he understood, or to fluency related measures, as might have been expected.

Subjective measures collected in the interview indicate that S thought he was able to understand conversations better. The results from the HPI were mixed. Seven subtests showed improvement after therapy and two showed poorer performance. The improvements on the Social Situations and Speech in Noise subtests suggest an improved ability to understand conversation in these conditions. Small improvement was also indicated in subtests that ask about hearing performance with many people at once and with familiar persons. In contrast the HPI results on the Intensity and Communication in Quiet subtests indicated poorer performance. It is not clear why it might be harder for S to communicate in quiet conditions if he was better able to understand conversation as a result of this program.

A consideration of all these results in combination is somewhat confusing. It is possible that the questions given as part of the TOPICON and tracking protocol do not accurately measure comprehension. In this study it was not possible to standardize them or the manner in which the related information was introduced into the conversation. The change in HPI results may indicate an increased awareness of communication difficulties rather than actual poorer performance, but this is speculation. The program attempts to increase metacommunication awareness and the HPI results may be evidence to that effect. S’s personal assessment of how much he understands in conversations outside the clinic could be related to understanding of other persons’ socially communicated intentions rather than to the actual information content of what is said. We communicate not only to relay information but to perform social acts. Content type questions may not accurately sample both communicative purposes.

In conclusion the evidence does not support this supposition strongly enough to conclude that S understands more of the content information relayed in conversation.
as a result of therapy, but it is suggestive of improvement in relaying of social information.

b. Increases in efficiency of communication, where efficiency is taken to be the rate at which information is conveyed:

Objective measures collected in the tracking exercise seemed to suggest that S's efficiency in conversation improved, but examination of the transcripts indicated that there were no changes in the frequency or type of S's repair requests. Tracking rates increased with both senders. There are strong indications, however, that the increase in rates with CP resulted mostly from changes that were sender initiated. Some rate changes may have been due to increased familiarity with the procedure or due to characteristics of the text material; this limits the reliability with which it can be concluded that rate increases indicate improved efficiency on the part of S.

The TOPICON procedure does not provide a good measure of efficiency as it is defined here, but we could consider the clause per minute or the clause per turn data as a possible indication of efficient use of time or turns to convey messages. The clause per minute information does not show any change with therapy. The clause per turn information shows that the most efficient conversation in this respect was the conversation at evaluation 4; however, the level of performance is not maintained at evaluation five. Pretherapy evaluation 2 had the next highest clause per turn ratio after evaluation 4. This does not support a view that the efficiency of the TOPICON conversations improved with therapy.

The subjective measures did not provide any information about efficiency, defined as the rate at which information is conveyed. The questions used in the subjective measures asked about performance, use, benefit and satisfaction, but did not specifically query efficiency according to this definition.

In summary, the objective measures did not support the hypothesis that S would
become a more efficient communicator. Changes in tracking rates were primarily due to sender initiated repairs.

c. Improved fluency of conversations:

Objective measures obtained for the TOPICON conversations provided limited support for this hypothesis. The proposed methods of assessing conversational fluency indicated that the conversation at evaluation 4 was the most fluent. However, the derived analysis measures and judgements of fluency did not indicate improvement of fluency related to therapy. The analysis measures and judgements did not show a high degree of agreement, other than on evaluation 4. It is possible that the lack of precision in the definition of conversational fluency confounded these particular results and made it difficult to determine exactly on what the speech-language pathologist based her evaluation.

It is possible that one element in the assessment of fluency used by the speech-language pathologist was related to the ways in which conversational breakdowns were repaired. Examination of repair sequences indicated that conversations at evaluations 4 and 5 had the lowest proportion of turns to total turns and clauses to total clause which were devoted to conversational repair. Also, these conversations had the highest rate at which repairs were made with one cue. These data indicate that the final conversations were more fluent in so far as dysfluencies were repaired most effectively after therapy.

Subjective measures gathered in the interview indicated that conversational fluency had improved as a result of therapy. S thought he was better able to participate in conversations and that he understood more in conversations with familiar and unfamiliar persons. The interview questions did not ask S to rate conversational fluency directly, but it is assumed that the positive comments in relation to use, benefit and satisfaction indicate indirectly that he was experiencing
increased fluency in his conversations. The HPI did not ask questions pertaining
directly to conversational fluency. The general improvement in hearing performance
in most of the subtests may be considered an indication of improved conversational
fluency, since the best definition of conversational fluency that we have is itself very
general.

d. Improved ability to repair conversational dysfluencies:

This hypothesis that S's ability to repair conversational dysfluencies would improve
is supported by objective data collected in the TOPICON procedure but is not
supported by the data collected during the tracking exercises. Examination of the
TOPICON repair sequence data, which showed improved ability to make repairs in the
final two evaluations, is discussed in the above section. On the other hand, the
tracking data showed that S made very few repair requests and that very limited
changes occurred in this pattern over the evaluation sessions.

Subjective measures collected in the interview support the hypothesis. S and CP
both provided examples of repairs being made by reference to therapy based
strategies. The Response to Auditory Failure subtest on the HPI showed the second
best improvement overall. This suggests that S's performance had improved because
he engaged in repair strategies when he could not understand what was said.

e. Satisfaction with ability to have conversations and to use the program based
strategies in different situations and contexts:

S's level of satisfaction with the therapy program was assessed by reference to
subjective measures and is indicative of overall benefit. In the interview S reported a
high level of satisfaction with the program and the way in which it helped him
become more involved in conversations. He reported on a variety of situations in
which he used program based strategies, in particular a youth group trip and a
wedding. He found that the program helped him engage in conversations with a number of unfamiliar persons. Third party reports from CP and his parents reiterated the same information. They were all satisfied with the results of therapy. S's mother believed that the benefit was most evident in S's new attitude of assertiveness and confidence.

In summary, the various results indicate that S did benefit from the therapy program, but benefits were not realized in all anticipated areas. There was strong evidence from both objective and subjective measures that his ability and willingness to make conversational repairs had improved. There was convincing subjective evidence to indicate that benefit was realized in improved satisfaction with conversations in different situations and that a new attitude of confidence and assertiveness helped him participate more fully in conversations. Subjective measures supported the hypothesis that conversational fluency improved with therapy, but the objective measures did not confirm this. The difference may be related to the imprecision in defining conversational fluency and its specific elements. There was no objective evidence to support the supposition that comprehension of the information content of conversations improved and subjective estimates of this factor were mixed. There is some suggestion that the social aspects of conversation may have improved. In the interview S reported that his comprehension had improved, while HPI results showed the contrary in some subtests. Efficiency of communication, as defined by the rate at which information is exchanged, did not show improvement in objective measures and was untested with subjective measures. The evaluation of efficiency related benefits may be influenced by the definition of the term. The efficiency with which conversations were repaired showed improvement, but this fell outside the definition of efficiency.
5.3.2 Hypothesis 2: Evaluation of Benefit to the Communication Partner

It was hypothesized that CP would benefit in the following areas:

a. Improved performance on efficiency related measures:

This is supported by objective measures. Tracking rate increases were due, in part, to sender directed strategies that improved the efficiency of repairs and the proportion of segments repeated correctly on initial presentation. Subjective measures did not measure efficiency.

b. Improved ability to effect conversation repairs:

Objective measures support this hypothesis. Data collected in tracking showed an increased repertoire of clarification cues after the start of therapy, and repair sequence data showed increased efficiency in making repairs with one cue.

Subjective measures collected in the interview indicated that CP was more aware of potential communication problems and of ways to make repairs. She reported an increased awareness of S's problems through use of the HELOS in therapy.

c. Satisfaction on subjective measures that gauge therapy benefit:

CP reported a high level of satisfaction on overall therapy benefit, 9 on a 1 to 10 scale. She also reported that her satisfaction rating of conversations with S was 8 or 9, while she rated satisfaction before therapy at about 6.

In summary, all results indicated that CP benefited from therapy by improved efficiency in relaying information to S and improved ability to make conversational repairs. These two items are related at some level, as it appears that efficiency in tracking data was related to efficient repair sequences. Other benefits were in the form of increased satisfaction in the way therapy had helped CP engage in conversations with her brother.
S.3.3 Hypothesis 3: Evaluation of Benefits After Four and Eight Hours of Therapy

It was hypothesized that by measuring benefits in a series of evaluations at regular time intervals it would be possible to determine if benefits were directly associated with the amount of therapy provided, and to determine if eight hours of therapy provided significantly more benefit than four hours. As there were two participants in therapy each will be considered separately. Evaluation 3 was the mid-point evaluation that marked the end of four hours of therapy.

Objective evaluation measures indicated that S derived benefits by becoming more efficient in making conversational repairs. This information was gathered by examining repair sequences in TOPICON conversations. The midpoint evaluation of these measures was not substantially better than the initial measure. Improvements over pretherapy performance did not occur until the fourth and fifth evaluations. The evidence is limited, but this suggests that benefit was not realized until more than four hours of therapy was provided. Since the other objective measures did not indicate benefit, they are not considered in regard to this matter.

Subjective measures were in the form of interview questions that asked if S thought the number of hours of therapy was adequate and if all sessions were useful. His responses indicated that he thought there were enough hours of therapy provided and that all sessions were useful for him.

Although the evidence is limited, both the subjective and objective measures indicate that eight hours of therapy provided more benefit for S than did four hours.

Examination of objective measurement data for CP were collected in tracking sessions. Tracking rates did not increase substantially by evaluation 3. Evaluation 5 showed a substantial increase. Other data showed that her repertoire of clarification strategies had been expanded by evaluation 3. Repair sequence data showed that she and S were becoming more efficient in clarification sequences by the midpoint
evaluation, but that substantial improvements over evaluation 3 were made in the final evaluation.

Subjective measurement was collected with the same questions that were asked S. CP’s responses were the same; i.e., she thought that the number of hours of therapy was adequate and that all sessions were useful.

Although objective measures showed that some benefit was realized after four hours of therapy, the subsequent gains shown in final evaluations along with subjective measures indicated that eight hours of therapy was of more benefit than four hours.

In summary, the measures that were available for evaluation indicated that eight hours of therapy provided substantially more benefit than did four hours for both S and CP. Because the data available for this assessment are limited these results are not conclusive. It is interesting to note that S and CP’s parents believed that the therapy provided a basis for future improvement that would not be realized immediately. This suggests that a longer evaluation time frame might be more useful.

5.3.4 Hypothesis 4: Agreement between Objective and Subjective Measures

It was assumed that conversation abilities can be evaluated. This study has used a number of different methods in that endeavor. The different methods examined different aspects of communication and provided results that were not always in agreement. Most notably the objective and subjective measures that evaluated the benefits S got from therapy did not always support the hypothesis about how the benefits would manifest themselves.

An explanation for these anomalies may be available if one adopts an evaluation model that recognizes that benefit can occur in different areas of client rehabilitation. The reader is referred back to section 1.1, which examines efficacy
studies and evaluation practices.

This section will briefly examine the objective and subjective measures used in this study and relate the findings from each measure to this evaluation model.

First, the objective measures gathered in TOPICON were used to evaluate conversational fluency and the efficiency of repair sequences. The conversational fluency measures are speculative, but it can be assumed that the assessment of elements of conversational fluency is related to the assessment of disability, in that the measurements are related to the ability to converse in a fluent manner. The objective measures did not provide unequivocal evidence to support the hypothesis that S would benefit by improved fluency. Subjective measures supported the hypothesis.

When we examine the construct of conversational fluency, it is apparent that it is not well defined. The fact that objective measures did not detect improvement may be related to the lack of an adequate definition that supports the construct. We may not know exactly what to look for. Impressions of fluency gathered in subjective measures may be the most meaningful way available at present to judge conversational fluency.

The value of TOPICON in this study was that it provided a naturalistic means by which to gather data, which proved to be useful in the analysis of conversation repairs. The procedure was also a valuable therapy tool for providing instruction and practice for the client. The procedure may also prove to be useful as a research method by which to investigate the construct of conversational fluency.

The tracking procedure as it was used in this study did not provide evidence of subject benefit. Tracking rates are taken as an indication of efficient communication, and can be thought of primarily as a measure of impairment or disability. Tracking rates will be influenced by the degree of a hearing loss or by an individual's ability to use amplification to help in the comprehension of speech (this can be demonstrated

130
with a normal hearing individual by introducing different levels of noise or distortion into the speech signal). Problems with standardization of procedures and materials limit the use of tracking in these ways in the clinical assessment of hearing loss.

The transcripts of tracking showed no changes in the way S performed the tracking procedure, which suggests that he did not benefit from therapy. There are probably two reasons why he did not show any change. Both are related to the nature of the tracking exercise, which removes some of the impetus for the receiver to explicitly request clarification measures.

1. The receiver knows that the sender will monitor his repetition, and if it is incorrect or incomplete, the sender will immediately attempt repair. The receiver need not request a repetition because it will be forthcoming, regardless, and requests for repetitions are counterproductive in that they consume time and reduce the overall rate. For the sake of speed the receiver benefits by allowing the sender to direct repair strategies.

2. The nature of evaluation in general, and of the tracking activity, in particular creates a social context in which the procedure places the sender in charge. It seemed, from examining the data, that the activity induces a certain posture on the part of the receiver, in which he relied on the sender to control most aspects of the activity, including repair.

The tracking procedure as it was used in this study proved to be useful as a training tool with CP and as an evaluation instrument in detecting changes in her ability to make efficient repairs. Examination of repair sequences showed how the efficiency of repairs improved with therapy. It can be argued that the reason for this is because therapy benefits in the case of CP were predominantly ability centered, while in the case of S they were handicap centered. The match of evaluation method to area of benefit was the correct one for CP, but not for S. An examination of the benefits that CP and S got from therapy shows that CP developed new skills by which
to communicate more effectively, while the greatest change for S was a change in attitude and awareness. A lifetime of hearing loss had probably given S many of the communication skills he needed to be a successful communicator and, consequently, few changes in ability were observed.

Following from this it is reasonable to see that subjective measures indicated benefit for S; the subjective measures sampled his attitudes and awareness, which from accounts given by him, by CP, and especially by his parents, showed significant changes as a result of therapy.

5.4 Clinical Implications

The results of this study show that an aural rehabilitation program based on the principles espoused by Erber provided immediate benefits to the hard-of-hearing client and to the communication partner who participated in therapy. The clinical implications of these results are that a conversation-based approach to aural rehabilitation can be beneficial to a range of clients. This subject had a severe-to-profound congenital hearing loss and did not fit into the category of intended clients, whose hearing loss is acquired. It may be because of the nature of his hearing loss that the benefits that S experienced were most strongly related to hearing handicap. The communication skills he had before entering therapy were remarkably good, considering the degree of hearing loss that he experienced. Individuals with acquired hearing loss may stand to benefit more from newly acquired communication skills.

The expansion of this approach to other client groups also presents the possibility that aspects of Erber's approach could be modified and incorporated in education programs for children with hearing loss. This would require an integration of information about language development and the development of metalinguistic knowledge.
Another finding of this study was that benefits may be derived in communication therapy by involving a communication partner. The results of this study suggest in particular that communication partners can benefit by learning new skills that help them become more efficient communicators. Increased awareness of the consequences of hearing loss on communication along with empathy for a hard-of-hearing partner can also provide benefits by helping the communication partner anticipate communication problems. The implication of these findings is that aural rehabilitation programs should consider not only hard-of-hearing clients but also the people with whom they have immediate contact.

Further implications are in the area of evaluation procedures and measures. This study used a combination of objective and subjective evaluation tools, each of which proved to be useful in the collection of different types of data and the indication of different types of benefits. The clinical implication is that evaluation of communication skills in conversation requires a number of measures. Any particular procedure may detect only certain types of changes in a specific aspect of the client's rehabilitation (i.e. rehabilitation of impairment, disability or handicap). The ability to converse fluently does not rest on one single skill that can be measured with one simple measurement.

5.5 FURTHER RESEARCH

This research suggests the need to determine more fully the nature of conversational fluency. The results obtained here indicate that an aural rehabilitation approach that is conversationally based needs assessment procedures by which to evaluate conversations. The research needs specifically to define the concept and the elements which comprise conversational fluency. The TOPICON procedure is a possible start to such research efforts. The analysis of conversations collected by the TOPICON procedure used in the present study is potentially valuable.
information in such research.

Other research that may prove to be useful would be to determine how this approach could be modified to provide appropriate service for educational programs that serve children with hearing loss. It is known that metalinguistic knowledge progresses in a developmental sequence, as does the use of conversation repair mechanisms (Brinton et al., 1986). The effect that hearing loss has on the development of these areas of knowledge could possibly be reduced to make communication more efficient and fluent.

5.6 SUMMARY and CONCLUSIONS

This research evaluated an aural rehabilitation program based on methods that attempt to increase a hard-of-hearing client’s metalinguistic knowledge and her/his knowledge of how language is used in conversations. A communication partner receives therapy as well as the client. Therapy attempts to help the two individuals use this knowledge to prevent and repair communication breakdown. Comprehension strategies based on the knowledge and in-clinic practice potentially enable the hard-of-hearing client to better understand conversations. The model for this aural rehabilitation program is described by Erber in Communication Therapy for Hearing-impaired Adults (1988). Central to Erber’s approach is the notion of conversational fluency, which attempts to define the ways in which conversations are efficient and coherent.

This research covered three areas of investigation: evaluation of benefit for both the hard-of-hearing client and the communication partner; evaluation of the program delivery by comparing benefits associated with four and eight hours of therapy; and a critical examination of evaluation methods available for assessing conversations.

The results indicated that both participants derived benefits from the therapy program. The subject of the research, a 19-year-old male with a severe-to-profound
hearing loss, benefited from therapy predominantly by becoming more able to effectively repair conversations and by becoming more confident and assertive in conversations. The communication partner, the 17-year-old sister of the subject, benefited from therapy by becoming more efficient in relaying information to S and by improved ability to make conversational repairs. Other benefits were in the form of increased satisfaction in the way therapy helped both of them to engage in conversations.

Examination of the data that indicated benefit associated with therapy suggested that eight hours of therapy were of more benefit than four hours. This information was limited, however, and these results are not conclusive.

Examination of the data collected by objective and subjective evaluation methods showed that the results did not always agree. It was concluded that the different evaluation methods were each suited to different communication related measures. For a particular method to indicate benefit it was necessary that there be a proper match between the measure of communication and the aspect of rehabilitation that actually showed improvement. For example, a measure such as tracking rates is best suited to evaluate a client's impairment or disability and will not likely detect improvement in the client's attitudes or impressions of handicap. The clinical implication is that a variety of measures may be required for evaluation purposes, because presently no single measure samples the wide spectrum of communication skills or client concerns.

This study has other clinical implications. It suggests that this approach may be valuable with a wide variety of clients, beyond the intended focus of hearing impaired adults with acquired hearing loss. The subject was a young adult with a significant congenital hearing loss. The research supports the belief that substantial benefit can be derived by including a partner in the therapy process.

Further research is motivated by the need to more fully understand and define the
construct of conversational fluency. At present it is a pretheoretical notion that needs to be stated in a testable form. Other research is needed to refine evaluation methods. As well, aspects of this therapy approach may be useful in the education of children with hearing loss; this would require research to test this assumption and research into the best ways to modify the program so that it accommodates the natural development of language and social skills.
REFERENCES


140


141


APPENDIX 1

THERAPY ACTIVITIES

This appendix presents a brief description of the activities that were done in therapy sessions with S and CP. It is arranged in three parts:

1. Presented first is the general plan that was followed in order that essential program materials be covered in the first block of therapy. Therapy was split into two blocks so that benefits could be evaluated after four and eight hours of therapy. Each block provided four hours of therapy. The general plan shows the therapy targets, activity guidelines and the session number in the first block. The second block reviewed the same basic material so a separate plan is not shown. Both blocks also incorporated materials and activities that were intended to address client concerns.

2. A list of activities and their description for each session is presented in brief point form. Therapy sessions are numbered 1 to 8 and the activities are listed under headings: S, CP or S & CP depending on who participated. Description of the activities includes, where appropriate, the materials used, the procedure and the purpose. Please refer to Erber (1988) Chapter 4 “Communication Practice” pp. 87-142 for complete descriptions of Erber’s clinical activities that were used in this study. Every session began with a conversation, at which time S and CP were free to bring up any concern they had or to discuss previous session. This was a regular event and is not noted in the list of activities.

3. Part three provides copies of some of the printed therapy materials used and the home activities. Each is identified by therapy session number.
1. GENERAL PLAN FOR FIRST BLOCK OF THERAPY

Therapy targets were determined by reference to Erber's suggestion (p.101) that there are four main contextual aids to comprehension of conversation: environment and situation, word order and word association, inter-personal and inter-relational factors and sequential contingencies. The other target included was effective repair strategies.

<table>
<thead>
<tr>
<th>Therapy Target</th>
<th>Activity guidelines</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pragmatic Awareness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--- Environment &amp; situation</td>
<td>a. Conversation in response to a situation or person</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>b. Conversations with people in limiting/non-limiting situations (inter-personal &amp; inter-relational factors).</td>
<td>1</td>
</tr>
<tr>
<td>Repair sequences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--- Directing the repair to get the necessary info</td>
<td>a. ASQUE activity - Erber</td>
<td>1 &amp; 2</td>
</tr>
<tr>
<td>Pragmatic awareness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--- sequential contingencies</td>
<td>a. response pairs with topical and situational constraints</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>b. utterance types and expected response</td>
<td></td>
</tr>
<tr>
<td>Syntactic Awareness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--- word associations</td>
<td>a. sentence frames</td>
<td>4</td>
</tr>
<tr>
<td>Semantic Awareness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--- word order</td>
<td>a. associated words/phrases, semantically redundant sentences</td>
<td>4</td>
</tr>
</tbody>
</table>
2. THERAPY SESSION ACTIVITIES

THERAPY SESSION 1

S

1. Context activity

Materials: Session 1 Context Activity handout

Procedure: Look at the handout and discuss what might possibly be said in the described situations. See section three for copy of the handout.

Purpose: Show that context in the form of the situation and people involved in a conversation influences what we say and also the meaning of what is said.

2. Conversation repair activity

Materials: File cards with a various general statements, yes/no, choice (either x or y) and specific questions (e.g. What kind of movies do you like?) printed on them.

Procedure: (See Erber’s ASQUE activity) S reads the cards and the clinician responds appropriately. S repeats clinician’s utterance to confirm comprehension. Discussion ensues about why some responses might be easier to understand than others.

3. Discussion of home activity. Handout. S to think about situations and people in conversations and try to anticipate what they will say. Report next meeting.

Mother (CP unable to attend this session)

1. Discussion about program and her expectations and goals. HELOS not working.

THERAPY SESSION 2

S

1. Repair sequence activity
Material: Two identified topics – a computer store and Jericho beach.

Procedure: S to follow the ASQUE series of utterances (see Session I or Erber for further description) with each context in mind, i.e. make a statement or ask a question about the topic. The clinician responded appropriately and a discussion follows about the difficulty of understanding each response.

Purpose: Show how the difficulty of understanding the response may be determined by the type of initiating utterance. Look at which type of utterance provides an answer that may be easy to understand/anticipate. Discuss how this might be useful in situations where S wants to get clarification about what had been said. Think also about context.

S and CP

1. Conversation information exchange activity

Materials: A sheet of paper, which was hidden from S, had five different squares drawn on it and a different item placed in each square. There were five groups of items, one of each group was placed in each area. The groups of items were: five family photographs from S and CP, five other photographs, five common household items, a collection of three different shapes of five different colours, and five sentences written on file cards. The same series of items was provided to S.

Procedure: S and CP talked about the items and their location. S placed his items in the same location on a sheet of paper he was given. He was to place an identified item in the identified location.

Purpose: To provide S and CP with practice in relaying specific information, and to provide S with practice in asking clarification questions.

CP

146
1. HELOS

Materials: magazine article, HELOS

Procedure: CP and clinician performed tracking activity with CP experiencing the simulated hearing loss.

Purpose: To provide CP with some idea of communication problems a hearing loss creates.

THERAPY SESSION 3

S

1. Conversational sequences activities

a. Discussion about conversation sequences, i.e. what they are, how they work, when we use them

b. Erber's Con-tingent activity (see Erber p.134)

Materials: Cards with general statements, yes/no questions, choice questions and specific content questions.

Procedure: The cards were read by S and the clinician responded appropriately. The cards that prompted responses difficult for S to understand were set aside and discussed later. The discussion centered on why the response was difficult to understand and how this could be understood in terms of conversational sequences.

CP

1. Conversation sequences discussed as they were with S

2. HELOS

Con-tingent activity (as with S above) done using HELOS with CP experiencing simulated hearing loss.
THERAPY SESSION 4

S

1. Con-descending activity (see Erber, p. 136)
Materials: A list of topics: bicycles, hockey, mathematics
Procedure: S makes statements and asks questions, as in the ASQUE activity, pertaining to each topic.
Purpose: To give S practice in formulating clarification questions.

2. Semantics and Syntax: started by a conversation defining and discussing how they are important in conversations
Material: Sentence frames, in which word were left out to highlight different syntactic structures.
Procedure: S filled in the missing words and explained how he had figured out the missing word.
Purpose: To demonstrate how sometimes a word that is not heard in conversation can be guessed at or anticipated.

S and CP

1. Conversation information exchange activity.
Materials: As in session 2
Procedure: As in session 2. A tape of 8-talker babble was played in the room to make the exercise more difficult.
Purpose: To provide practice for S and CP in relaying information and making clarifications when required.
CP
1. HELOS
a. discussion of syntax and semantics using sentence frames with a word missing
Procedure: CP listened to sentences presented through the HELOS and tried to guess the missing word when it was predictable from sentence context and when it was not predictable.
Purpose: To show how syntactic and semantic awareness can assist in comprehension of an utterance, and to provide her with an awareness of how she could speak so that it might be easier for S to understand.

THERAPY SESSION 5
S
1. Con-descending activity -- done as per session 4.
Purpose: To give S more practice in forming clarification requests.
2. Topic change activity -- included at the request of S and CP who had identified problems in conversations when topic changes occurred.
Materials: Handout discussion topic and topic change.
Procedure: A conversation was conducted after which the participants wrote down the different topics talked about. The changes in topic were discussed in relation to the different vocabulary associated with each topic and the problems that topic changes caused for S.

CP
1. Topic change: A discussion was conducted with CP about how an awareness of context, conversation sequences, syntax and semantics might help a hard-of-hearing person follow a conversation with topic changes.
Purpose: To promote an awareness of these problems and possible ways that CP could
could make her contributions to a conversation help S by making topic shifts more apparent and easier for S to follow.

2. HELOS
Procedure: The clinician and CP had a conversation with both taking turns experiencing the simulated hearing loss. Frequent topic changes were made and a discussion was held about the problems experienced following changes and about how a conversation partner could help the hard-of-hearing person follow.

THERAPY SESSION 6
S
1. Con-openers -- see Erber’s description p. 136
Materials: A list of different topics
Procedure: S began a conversation with the clinician on each topic. He was to keep in mind the clinician’s probable response to his opener.
Purpose: To help S generate conversation opening utterances.

2. Discussion of conversation styles - The discussion was about passive, assertive and aggressive styles of conversation participation and the consequences of each style.

S & CP
1. Group conversations with topic changes
Procedure: A group conversation was conducted. After the conversation everyone wrote down what we had talked about. Another conversation was conducted and this time S was instructed to look to CP for cues to help him follow the conversation. The topics of conversation were again written down after the conversation was over. A third conversation was conducted in which S and CP were instructed to work together,
with S cueing on what CP said and CP trying to assist S by using semantic/word related cues or topic announcements to help him. The topics of discussion were again written down and discussed.

Purpose: To show how S could follow the conversation better, if he anticipated topic changes and if he and CP worked together to note topic changes when they happened.

CP

1. HELOS: A conversation was conducted with the clinician, who introduced frequent topic changes. The conversation was analyzed and discussed.

THERAPY SESSION 7

S & CP


Procedure: Two conversations were held: in the first S observed and placed the objects as CP and the clinician talked about them, in the second conversation S was instructed to join in the conversation. In both cases the number of correctly chosen and placed objects were noted. Discussions about the two activities followed.

Purpose: To demonstrate to S that he would get more information from a conversation if he joined in and asked questions or made comments when he needed specific information.

CP

1. Discussion of speech reading: the discussion centered on the importance of the visual aspect of communication for S and on the visibility of certain sounds and words.
THERAPY SESSION 8

S
1. Con-descending activity: as described earlier, only on this occasion family pictures were used as topics.

CP
1. HELOS
Materials: a. Tracking using a magazine article
   b. Conversation in which CP and the clinician took turns describing and identifying family pictures by asking questions and considering word associations as they were described.

Purpose: To provide practice for CP in forming utterances that had would be easy for S to understand.

3. THERAPY HANDOUTS

Therapy Session 1: Context activity

Conversation Context

Often what we say makes sense because of the context in which we say it. “Context” can include the people and things that are present around us, the time or place that we are talking, and information that we share with the people we are talking to. For example, if someone in your family were to say “It’s cold in this room”, you would recognize that they were actually asking you to close an open window behind where they were sitting. You would know this because you can feel the breeze, see the open window, see that they are wearing only a light shirt, and know that they have a cold and aren’t feeling well. You would realize that they were asking you in an indirect way to close the window for them. The “context” in which this
statement was said helps you recognize it as a request.

Context can also include the conversation that surrounds what you say. For example, if you say “I’d like to have one, but they can be a problem if you are traveling or on holidays.” This would make sense to me because our conversation was about dogs, and not about getting a haircut.

Since we use context to help us understand what has been said, we can also use it to make “informed guesses” about what probably was said when we didn't hear or understand everything, and to anticipate how someone might respond to what we say.

***

Below are some sentences and descriptions of different situations in which the sentences might be said. Read each one and take a guess as to what the response might be from the person mentioned in the situation as described. Some responses will be easier to guess than others. Think about them briefly and we will discuss what might make some more predictable than others.

<table>
<thead>
<tr>
<th>Sentence</th>
<th>Context</th>
</tr>
</thead>
</table>
| 1. “What’s cookin?” | a. Your father, who is making dinner in the kitchen  
  b. A group of friends at school. |
| 2. “I need ten dollars.” | a. Your mother, as she sits watching T.V. |
b. Your mother, as you both stand in the checkout line at a department store.

   b. A friend visiting from Spain.

4. “Do you like to get up early?” a. To me, now.
   b. To me, at 3:00 a.m., after we have spent the entire day helping another friend move.

5 a. “I’m really hungry” To your mother, as she is cooking dinner.
   b. “When will dinner be ready?”

6 a. “Is there another bus to Kelowna today?” To a ticket agent at the bus depot.
   b. “I think I missed my bus to Kelowna.”

7 a. “Did you want a sentence or paragraph answer for question number 2?” To your teacher as she is returning an exam.
   b. “I’m not sure why I lost marks on question number 2.”

8 a. “Fill it up with regular, please.” To a gas station attendant
   b. “Fill it up please.”

***

154
Notes: Think about — who is the person? do you know them well/know them at all/know what their role or job is?
— where is the conversation taking place?
— what effect does what you say have on how they respond?
   Is there any difference when you ask a question or make a statement?

**Therapy Session 1:** Home Activity

Something to try at home — for next week. You can tell me about the results next time we meet.

1. Find 1 or 2 situations where you think you will be able to guess what someone will say in response to what you say. Think about your guess for a moment or two before you test it. Tell me about how close you came to making an accurate guess.
2. When a situation occurs where you are having trouble understanding what is said, try asking either a yes/no question or a choice question that will help you get some information that clarifies things for you. Tell me about the results.

**Therapy Session 2:** Home Activity for S and CP

In the next few days or week, note two occasions where there are misunderstandings in conversations that you are involved in. Think about what might be possible causes for your misunderstanding — were you not paying attention, was the speaker talking too softly, could you not see their face, etc. Tell me about the situations and the things that you and the speaker did to clear up the misunderstanding.

Think about a conversation sequence that you could be involved in to clarify a
misunderstanding. Make one up if you want, or remember one that actually happened. Write it out like a script in a play (who said what, in the order that it was said). Think about the number of turns each person takes and how the things said influenced what was said after. Be imaginative in any way you want if you decide to make one up.

Therapy Session 5: Handout

TOPIC

"Topic" refers to the things that we talk about -- the topic of conversation. People with a hearing loss commonly report that they have problems following conversations when the topic of discussion changes frequently. There can be a number of reasons for this. The ways that topics change can be very subtle: sometimes a single word, or a pause or a change in the tone of voice can indicate that we are speaking about "something else". Some people skip from topic to topic many times in a conversation, without any notice, making it difficult for anyone to follow along. Even people with excellent hearing sometimes fail to follow the twists and turns of a conversation.

In some conversations the topic is announced, or very evident from the situation. These conversations are often conducted with a purpose -- for example a meeting, or class lecture, or to decide where to go on vacation, or what to get at the grocery store. Most often when we meet socially the conversation goes through a number of topics -- the changes depend on the interests and personalities of the people involved. With people that we know well, we may know beforehand some of the things we will probably talk about -- for example: family, job, hobbies etc.

The conversation problems that arise from topic changes may not be easily
resolved, but there are several things that we can think about and do:
in formal or important situations, an agenda or list of topics can be agreed upon. A person with a hearing loss can follow more easily when the order of topics is known and followed.

-- be aware of and sensitive to the styles of people we talk to regularly. For someone conversing with a person that has a hearing loss, this might mean stating what it is we are talking about and announcing when we want to talk about something else. Avoid frequent unrelated topic changes. Check or confirm that the other person is following along with what you are saying.

For a person with a hearing loss -- use clarification requests to confirm topics or clear up misunderstandings. Be aware of some of the ways that your conversation partner(s) commonly signal topic changes. For example:

-- sometimes people use a word or phrase to show they are changing topic: now/ now then/ then/ and/ so/ Did I tell you about.../ Did you hear about.../ etc.

--sometimes people pause briefly, without saying anything, before introducing a new topic

THERAPY SESSION 6: Home Activity

Something to think about for next week. No need to write anything down, we will just talk about this at our next session.

Over the past sessions we have talked about:
1. Situation
2. Clarification requests
3. Conversational sequences

4. Syntax and semantics (word order/word meaning)

**Question:** In a group conversation, how might each of these be useful to help you understand more of what is said?

**SOMETHING TO DO FOR NEXT WEEK**

Think about having a conversation with the following people

1. Your cousin
2. Your family at dinner
3. Your teacher

For each of these conversations write down three topics you might talk about. For each topic write down five words that might be used in discussing that topic. In total you should have 9 topics and 45 words.
APPENDIX 2
S's AUDIOGRAM

This audiogram is a copy of one recorded at a hearing assessment done in 1990.

**PURETONE AUDIOGRAM**

**Audiogram Key**

**SPEECH AUDIOMETRY**

**Remarks:** Similar to previous findings of severe to profound hearing loss for both ears with normal middle ear pressure and mobility. Aided function was in mild-moderate low range 250-2000 Hz and is considered good.
APPENDIX 3

VERBAL PROTOCOL

Following tracking exercises S was asked questions 1, 2, 10. If the tracking text had been done in noise he was also asked question 11. The remaining questions were not applicable to the tracking procedure. All questions, except 11, were asked following TOPICON conversations.

1. a. Overall, how much of the conversation do you think you understood?
   (all = 10, none = 0)
   b. Overall, how much of the conversation do you think the experimenter understood?

2. a. Overall, how effortful or tiring was the conversation?
   (extremely = 10, not at all = 0)
   b. Overall, how effortful or tiring was the conversation for the experimenter?

3. What are the advantages and disadvantages of discussing a familiar/unfamiliar topic?

4. Who talked more during the conversation? Why?

5. Who asked more questions during the conversation? Why?

6. Who answered more questions during the conversation? Why?

7. What caused problems understanding during the conversation?

8. What parts of the conversation were the easiest? Why?

9. What parts of the conversation were the hardest? Why?

10. What solutions to problems understanding were tried and how well did they work?

11. What was the effect of the noise on you? Were you aware of it? How distracting was it?
APPENDIX 4

INTERVIEW QUESTIONS

The following program evaluation form was given to S and CP. They provided written answers on the page and they also discussed the questions in conversation with the investigator. Parts 1 and 2 of the evaluation form were given to S and parts 2 and 3 were given to CP. Part 2 asks questions about program delivery that were relevant to both S and CP, while part 1 was written for S and part 2 for CP.

PROGRAM EVALUATION

The following questions are asked in order to evaluate the therapy program. An important part of the evaluation is to find out about your impressions and observations. The questions are for you to think about, and to guide our conversation when we talk. You may want to consider them beforehand and write down some points — I will tape record our conversation so that I can refer back to specific things we talk about.

There are two separate parts to this evaluation. One part refers to your thoughts about the program itself and the other part to the way in which I ran the program. Your honest and frank comments are welcome and are sincerely encouraged. Without them we cannot make a valid evaluation of the program. When we talk about the program, I am interested in what you thought and felt about the things we did during evaluation and therapy sessions, and if you found them helpful. When we talk about the way I conducted the program, I want to know about your thoughts on the way I did things — what you liked or didn’t like. Both types of information are important. In case you feel uncomfortable in making comments about me, I will ask
you to write these comments and mail them to me in an envelope that I will provide. I will not read them until I have finished with the rest of the program evaluation. However, I will be happy to talk to you or answer any questions you have.

PART 1

QUESTIONS about the programs

1. In therapy sessions we talked about different things you could think about or do that might help you better understand what is being said in conversations. Have you used any of these things while having a conversation? What, if anything, have you done? What has been the most useful?

2. In some of our sessions we talked about how conversations may be structured. Have you noticed other people doing some of the things we talked about; things that you didn’t notice before? For example -- behaviour related to the situation or topic changes, or maybe the way they respond to what you say--- or anything else.

3. Since you have taken part in this program has there been a change in how much you understand in conversations? Do you think that:
   a. you understand about as much as before
   b. you understand more than before
   c. you understand less than before

4. How would you rate any benefit you have received from this program? By this I mean do you think that it has been, or will be, something that improves your ability to communicate.
   0 = none to 10 = extremely beneficial
5. Since you have taken this program, do you think that you:
   a. take part in conversations about the same amount as before
   b. take part in conversations more than before
   c. take part in conversations less than before.
   By "take part" I mean talk or take turns.

6. Do you think that the effort or work necessary for you to have a conversation has changed since you have taken part in the program?
   a) more effort
   b) less effort
   c) about the same as before

7. Are you satisfied with how much you understand in conversations?
   0 = not at all to 10 = very satisfied. Has this changed, and if so, how has it changed?

8. Are you satisfied overall with this program?
   0 = not at all to 10 = very satisfied

9. Do you think you are more aware, as a result of this program, of how you and others interact when having a conversation?

Part 2.
Questions about the way the program was presented. To be mailed in.

S and CP
1. Do you think there were:
   a) enough hours of therapy
   b) too many hours

163
c) not enough hours

2. Was there any time in the course of the therapy program that you thought you had received enough therapy, and that the rest of our sessions were not very much help to you?

3. Was there anything you wanted me to do that I did not do, and was there anything I did that you thought was a waste of time?

4. Did I respond to your wishes and goals in a way that you thought was appropriate?

5. Is there anything I could do to make this program better for you?

6. Was there anything we did that you found especially helpful?

7. Was the scheduling of meeting times satisfactory for you?

Part 3 Questions about the Program

CP

1. At home did you discuss the program -- the things we did and talked about in our sessions-- with S or other family members?

2. Have you noticed any change in the way S participates in conversations since being involved in this project? Any change in the way you converse with him?

3. Has S asked you to do anything to help him take part in a conversation, or told you
how you could make it easier for him to understand? Have you observed him doing any of these things with other people?

4. Have you had the opportunity to use any of the things we talked about that can help make a conversation easier for S to follow?

5. How would you rate the benefits of this program. By this I mean do you think that it has been, or will be, something that improves your ability to communicate with S. 0 = none at all to 10 = extremely beneficial

6. Do you think that the effort or work necessary for you to have a conversation with S has changed since you have taken part in the program? Is it a) more effort b) less effort c) about the same as before

7. Are you satisfied with what this program has provided you? By this I mean, how do you feel about the overall usefulness of what we did? 0 = not at all to 10 = very satisfied.

8. How do you feel about your ability to comfortably communicate with each other? Are you satisfied with your conversations in general? 0 = not at all to 10 = very satisfied.