Chapter 3
Method

3.1 Aim

3.2 Objectives of the study

3.3 Research design

3.4 Hypothesis

3.4.1 Null hypothesis.

3.4.2 Alternative hypothesis.

3.5 Participants

3.5.1 Source of the participants.

3.5.2 Criteria for selection of participants.

3.5.2.1 Common criteria for both normal (typical/non-clinical) and clinical groups.

3.5.2.2 Criteria for the groups with healthy elderly.

3.5.2.3 Criteria for the groups with persons with mild dementia.

3.5.3 Demographic details of the participants.

3.6 Assessment Protocol

3.6.1 Part I: Materials used during pre-data collection phase.

Informed Consent Form.
Verbal information sheet:
The consent form:
General History Sheet.
Mini Mental Status Examination (MMSE).
Clinical dementia rating scale.
International Second Language Proficiency Rating Scales (ISLPR).

3.6.2 Part II: Materials used during data collection.

3.6.2.1 Phase I: Testing the cognitive linguistic abilities

Addenbrooke’s Cognitive Examination Revised (ACE-R).
Cognitive linguistic assessment protocol (CLAP).
3.6.2.2 Phase II: Obtaining discourse sample.

Picture description.
Conversation.

3.6.3 Equipments.

3.6.4 Software

Systematic Analysis of Language Transcripts (SALT).
Statistical Package for Social Sciences (SPSS).

3.6.5 Part III: Materials used while analyzing discourse samples.

Measures of lexical richness.
Type token ratio (TTR).
Brunet’s index (W).
Honore’s Statistic (R).

T-unit based analysis.
Discourse assessment scale.

3.6.6 Description of materials.

3.6.6.1 Part I: Materials used during pre-data collection phase.

3.6.6.1.1 Informed Consent Form.
3.6.6.1.2 General History Sheet.
3.6.6.1.3 Mini Mental Status Examination (MMSE).
3.6.6.1.4 Clinical dementia rating scale.
3.6.6.1.5 International Second Language Proficiency Rating Scales (ISLPR).

3.6.6.2 Part II: Materials used during data collection phase.

3.6.6.2.1 Materials used for obtaining cognitive-linguistic data.
3.6.6.2.1.1 Addenbrooke’s Cognitive Examination Revised (ACE-R).
3.6.6.2.1.2 Cognitive linguistic assessment protocol (CLAP).

3.6.6.2.2 Material used for obtaining the data of discourse production.
3.6.6.2.2.1 Picture description.
3.6.6.2.2.2 Conversation.

3.6.6.3 Part III: Materials used while analysing discourse samples.

3.6.6.3.1 Measures of lexical richness.
3.6.6.3.1.1 Type token ratio (TTR).
3.6.6.3.1.2 Brunet's index (W).
3.6.6.3.1.3 Honore's Statistic (R).

3.6.6.3.2 T-unit based analysis.
3.6.6.3.3 Discourse assessment scale.

3.6.6.4 Software used in the present study.
3.6.6.4.1 Systematic Analysis of Language Transcripts (SALT).
3.6.6.4.2 Statistical Package for Social Sciences (SPSS).

3.7 Procedure

3.7.1 Part I: Pre-data collection.
3.7.1.1 Informed consent.
3.7.1.2 History.
3.7.1.3 Assessing language proficiency using ISLPR.
3.7.1.4 Clinical dementia rating scale.
3.7.1.5 Mini Mental Status Examination.

3.7.2 Part II: Data collection.

3.7.2.1 Phase I: Testing the cognitive linguistic abilities.
3.7.2.1.1 Section I: Testing the cognitive linguistic abilities using Addenbrooke’s Cognitive Examination Revised
3.7.2.1.2 Section II: Testing the cognitive linguistic abilities using Cognitive linguistic assessment protocol

3.7.2.2 Phase II: Obtaining discourse sample.
3.7.2.2.1 Picture description.
3.7.2.2.2 Conversation.

3.7.3 Part III: Analyzing discourse samples.

3.7.3.1 Transcription of discourse samples.
3.7.3.2 Quantitative analysis of Picture description.
3.7.3.2.1 Extracting lexical words.
3.7.3.2.2 Example 1. Discourse sample elicited on picture description.
3.7.3.2.3 Translation of the picture description.
3.7.3.2.4 Building the corpora.
3.7.3.3 Quantitative analysis of Conversational discourse.

3.7.3.3.1 Example 2. Division of clauses and T-units for a part of discourse related to conversation.

3.7.3.4 Qualitative analysis of discourse samples.

3.7.3.4.1 Trial rating phase.
Chapter 3

Method

3.1 Aim: The aim of the present study was to investigate the discourse abilities in monolingual and bilingual persons with dementia (PWD) as compared to the healthy elderly (HE).

3.2 Objectives of the study: There were two primary objectives in the study.

1. To study the discourse abilities in persons with dementia as compared to healthy elderly.
   a) The performance of persons with dementia and healthy elderly on quantitative analysis of picture description using measures of lexical richness.
   b) The performance of persons with dementia and healthy elderly on quantitative measures of conversation using T-unit based analysis.
   c) The performance of persons with dementia and healthy elderly on qualitative measures of picture description and conversation using Discourse Assessment Scale.

2. To study the cognitive linguistic abilities in persons with dementia as compared to healthy elderly.
   a) The performance of persons with dementia as compared to healthy elderly on Addenbrooke's Cognitive Examination Revised.
   b) The performance of persons with dementia as compared to healthy elderly on Cognitive Linguistic Assessment Protocol.

3.3 Research design: A cross sectional standard group comparison research design was employed for the present study.
3.4 Hypothesis

3.4.1 Null hypothesis.

- It is hypothesized that there would be no difference in cognitive and discourse abilities in persons with dementia when compared to that of healthy elderly.
- It is hypothesized that there would be no difference between monolingual and bilingual participants in their performance on cognitive and linguistic skills because of the bilingual advantage.

3.4.2 Alternative hypothesis.

- It is hypothesized that there would be difference in cognitive and discourse abilities in persons with dementia when compared to that of healthy elderly.
- It is hypothesized that there would be difference between monolingual and bilingual participants in their performance on cognitive and linguistic skills because of the bilingual advantage.
Figure 3.1. Flow chart depicting the procedure and the analysis of the study
3.5 Participants

The participants for the study were 20 persons diagnosed with mild dementia and 60 healthy elderly. A total of 80 people participated in the study. Among the 20 persons with dementia (PWD), 10 were predominantly monolinguals (referred to as ‘monolinguals’ hence forth; who spoke Kannada predominantly) and the other 10 were predominantly bilingual speakers (referred to as ‘bilinguals’ hence forth; who spoke Kannada as well as English). Out of 60 healthy elderly (HE) individuals, 30 were monolingual and 30 were bilingual speakers. The age range of the participants was 65 - 85 years. The monolingual and bilingual persons with dementia constituted the clinical group and the monolingual and bilingual healthy elderly constituted the non-clinical/ normal/ healthy elderly group.

3.5.1 Source of the participants.

Majority of the participants from the clinical group attended a geriatric clinic at the National Institute of Mental Health and Neurosciences (NIMHANS), Bangalore, India. A few of the participants were selected from Nightingales Medical Trust (a day care and residential shelter for persons with dementia), Bangalore, India. The participants from the normal group were drawn from senior citizen homes/ laughter clubs/ residential places in and around Mysore and Bangalore, Karnataka, India.

3.5.2 Criteria for selection of participants.

Participants were included in the study only on fulfilling certain specific criteria. The criteria were different for normal and clinical groups, with a few common criteria for the two groups.

3.5.2.1 Common criteria for both normal (typical/non-clinical) and clinical groups.

All the participants had to fall within the age range of 70 - 85 years. They should have undergone a minimum of 12 years of formal education. All of them should have
Kannada (Kannada is one of the major Dravidian languages predominantly spoken in the state of Karnataka, South India) as their first language (L1) and English as their second language (L2). They should also have vision and hearing acuity corrected to normal/ near normal limits. They should have obtained a score of “three” and above on the International Second Language Proficiency Rating Scale (ISLPR) by Wylie & Ingram (2006), suggesting that the candidate would have basic vocational proficiency in that particular language. The scale was administered both in Kannada as well as English.

3.5.2.2 Criteria for the groups with healthy elderly.

Healthy elderly participants had to be free from any neurological (such as stroke, dysarthria, etc) or psychological illness (such as, mental retardation, memory impairment, schizophrenia etc). They should not have complains of memory or any other cognitive difficulties which would influence their communicative abilities. They had to obtain a score of 25 and above in mini mental status examination (MMSE; Folstein, Folstein, and McHugh, 1975) and a score of “zero” in the clinical dementia rating scale (CDR; Hughes, Berg, Danziger, Coben & Martin, 1982).

3.5.2.3 Criteria for the groups with persons with mild dementia.

The clinical population has to be identified/ diagnosed by neurologists/ psychiatrists/ neurosurgeon or geriatric medical specialist. The clinical group had to obtain a score of “one” (mild) in Clinical Dementia Rating scale for the diagnosis to be made as mild dementia in association with the score obtained from MMSE. The clinical group had to undergo medical screening including neuropsychological assessment, and Computerized Tomography (CT) scanning of the head. Medical screening included neuropsychological assessment and Computerized Tomography (CT) scanning of the head.

3.5.3 Demographic details of the participants.

The demographic and neurological details of the participants in the clinical group are as shown in Table 3.1.
Table 3.1

Demographic and neurological details of the clinical participants.

<table>
<thead>
<tr>
<th>Sl no.</th>
<th>Age/sex</th>
<th>CDR</th>
<th>Language</th>
<th>Diagnosis of dementia</th>
<th>Neuroimaging results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>77/f</td>
<td>1</td>
<td>M</td>
<td>Mild AD</td>
<td>Bilateral medial temporal atrophy</td>
</tr>
<tr>
<td>2</td>
<td>72/f</td>
<td>1</td>
<td>M</td>
<td>Mild AD</td>
<td>Diffuse central atrophy</td>
</tr>
<tr>
<td>3</td>
<td>69/f</td>
<td>1</td>
<td>M</td>
<td>Mild vascular dementia</td>
<td>Diffuse brain atrophy</td>
</tr>
<tr>
<td>4</td>
<td>68/m</td>
<td>1</td>
<td>M</td>
<td>Mild vascular dementia</td>
<td>Diffuse brain atrophy</td>
</tr>
<tr>
<td>5</td>
<td>86/f</td>
<td>1</td>
<td>M</td>
<td>Mild AD</td>
<td>Bilateral medial temporal atrophy</td>
</tr>
<tr>
<td>6</td>
<td>68/m</td>
<td>1</td>
<td>M</td>
<td>Mild AD</td>
<td>Diffuse brain atrophy</td>
</tr>
<tr>
<td>7</td>
<td>66/m</td>
<td>1</td>
<td>M</td>
<td>Mild AD</td>
<td>Bilateral sub-cortical infarcts</td>
</tr>
<tr>
<td>8</td>
<td>71/m</td>
<td>1</td>
<td>M</td>
<td>Mild mixed dementia</td>
<td>Multiple cerebral infarcts</td>
</tr>
<tr>
<td>9</td>
<td>69/m</td>
<td>1</td>
<td>M</td>
<td>Mild mixed dementia</td>
<td>Multiple cerebral infarcts</td>
</tr>
<tr>
<td>10</td>
<td>75/m</td>
<td>1</td>
<td>M</td>
<td>Mild AD</td>
<td>Bilateral medial temporal atrophy</td>
</tr>
<tr>
<td>11</td>
<td>67/f</td>
<td>1</td>
<td>B</td>
<td>Mild AD</td>
<td>Bilateral medial temporal atrophy</td>
</tr>
<tr>
<td>12</td>
<td>72/f</td>
<td>1</td>
<td>B</td>
<td>Mild AD</td>
<td>Diffuse central atrophy</td>
</tr>
<tr>
<td>13</td>
<td>69/f</td>
<td>1</td>
<td>B</td>
<td>Mild vascular dementia</td>
<td>Diffuse brain atrophy</td>
</tr>
<tr>
<td>14</td>
<td>68/m</td>
<td>1</td>
<td>B</td>
<td>Mild mixed dementia</td>
<td>Multiple cerebral infarcts</td>
</tr>
<tr>
<td>15</td>
<td>85/f</td>
<td>1</td>
<td>B</td>
<td>Mild AD</td>
<td>Bilateral medial temporal atrophy</td>
</tr>
<tr>
<td>16</td>
<td>68/m</td>
<td>1</td>
<td>B</td>
<td>Mild AD</td>
<td>Diffuse brain atrophy</td>
</tr>
<tr>
<td>17</td>
<td>66/m</td>
<td>1</td>
<td>B</td>
<td>Mild AD</td>
<td>Bilateral sub-cortical infarcts</td>
</tr>
<tr>
<td>18</td>
<td>71/m</td>
<td>1</td>
<td>B</td>
<td>Mild mixed dementia</td>
<td>Multiple cerebral infarcts</td>
</tr>
<tr>
<td>19</td>
<td>69/m</td>
<td>1</td>
<td>B</td>
<td>Mild vascular dementia</td>
<td>Diffuse brain atrophy</td>
</tr>
<tr>
<td>20</td>
<td>75/m</td>
<td>1</td>
<td>B</td>
<td>Mild AD</td>
<td>Bilateral medial temporal atrophy</td>
</tr>
</tbody>
</table>

Notes.

CDR= Clinical dementia rating, m= male, f = female, AD = Alzheimer’s dementia, M = monolingual, B = bilingual.

The normal group was matched with the clinical group for age, education and handedness in addition to the sub-grouping into monolinguals and bilinguals. The details of the number of participants, age, years of education and handedness are depicted in the table 3.2. Table 3.2 also shows the duration of illness for participants in the clinical group.
Table 3.2

*Age, years of education, and handedness of all the participants, and duration of illness for persons with dementia.*

<table>
<thead>
<tr>
<th></th>
<th>HE, N= 60</th>
<th>PWD, N= 20</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Age</td>
<td>72.6yrs</td>
<td>6.39792</td>
</tr>
<tr>
<td>Years of education</td>
<td>12.8yrs</td>
<td>1.68655</td>
</tr>
<tr>
<td>Duration of illness (in months)</td>
<td>--</td>
<td>7.7months</td>
</tr>
<tr>
<td>Handedness</td>
<td>Right</td>
<td></td>
</tr>
</tbody>
</table>

*Notes.*

HE = Healthy elderly, PWD = persons with dementia, M = mean, SD = standard deviation, N = number of participants.

### 3.6 Assessment Protocol

There were several, test protocols, checklists, equipments, software etc employed for the present study for prior to and during data collection process.

#### 3.6.1 Part I: Materials used during pre-data collection phase.

- Informed consent form
- General history form with demographic and medical details.
- Mini Mental Status Examination
- Clinical dementia rating scale
- International Second Language Proficiency Rating Scale

#### 3.6.2 Part II: Materials used during data collection.

##### 3.6.2.1 Phase I: Testing the cognitive linguistic abilities.

- Section I: Testing the cognitive linguistic abilities using Addenbrooke’s Cognitive Examination Revised (ACE-R, Indian adaptation by Krishnan & Lokesh, 2010).
- Section II: Testing the cognitive linguistic abilities using Cognitive Linguistic Assessment Protocol (CLAP; Rajasudhakar & Shyamala, 2005).
3.6.2.2 Phase II: Obtaining discourse sample.

- Section I: Obtaining discourse sample of picture description using two coloured pictures ‘a village’ and ‘a city centre’ (Appendix 3A and 3B).
- Section II: Obtaining discourse sample of conversation using two topics (‘Wedding plans’ and ‘Generation gap’).

3.6.3 Equipments.

- Handycam (Sony digital recorder H302233)
- Sony DVD for video recording

3.6.4 Software

- Systematic Analysis of Language Transcripts (SALT).
- SPSS 18.0

3.6.5 Part III: Materials used while analysing discourse samples.

The discourse samples were analysed qualitatively and quantitatively. For the same, T-unit based analysis (for conversation task), measures of richness of vocabulary (for picture description) and qualitative rating of discourse using Discourse Assessment Scale (for the conversation task and picture description) were employed.

- Measures of lexical richness: included, Type token ratio (TTR), Brunet's index (W) and Honore’s Statistic (R).
- T-unit based analysis.
- Discourse assessment scale

The materials used for the present study are described in brief in the following section.

3.6.6 Description of materials

3.6.6.1 Part I: Materials used during pre-data collection phase.

3.6.6.1.1 Informed Consent Form.
Informed consent was obtained from each of the participants. The informed consent form consisted of two parts: the verbal information sheet and the consent form.

**Verbal information sheet:** The information sheet consisted of brief statement of research being carried out and explained the reason the participants were invited to the research. They were informed that they may talk to anyone they feel comfortable with, about the research and that they can take time to reply as to whether they wanted to participate or not. Assurance was provided to the participants that they would be clarified of any doubts at anytime during the data collection/study. Information sheet consisted of a clear appreciation and understanding about introduction to the study, purpose of the research, type of research, participant selection, voluntary participation, procedures and protocol, duration, confidentiality, sharing the results, right to refuse or withdraw, and who to contact.

**The consent form:** The certificate of consent consisted of written statement in first person, in bold.

### 3.6.6.1.2 General History Sheet.

General history included name, age/sex, address and contact, languages known, handedness, education, occupation, information about hearing and vision, history of neurological/psychological illness, presenting illness, and address and contact number. Detailed medical history (if any) which included presenting symptoms, details of medical and non-medical treatments, and information about tests which they had undergone was obtained from the participants.

### 3.6.6.1.3 Mini Mental Status Examination (MMSE).

The mini-mental state examination (MMSE) or Folstein’s test is a brief 30-point questionnaire test that is used to screen for cognitive impairment. It was introduced by Folstein, Folstein, and McHugh (1975) in 1975. It is commonly used to screen for
dementia. It is also used to estimate the severity of cognitive impairment at a given point in time and to follow the course of cognitive changes in an individual over time. It is an effective way to document an individual's response to treatment.

In a time span of about 10 minutes MMSE samples various functions including arithmetic. The MMSE test includes simple questions and problems in several areas: the time and place of the test, repeating lists of words, arithmetic such as the serial sevens, language use and comprehension, and basic motor skills. For example, a question is asked to copy a drawing of two pentagons. Any score greater than, or equal to 25 points (out of 30) is effectively normal (intact). Below this, scores can show severe (≤9 points), moderate (10-20 points) or mild (21-24 points). Low to very low scores correlate closely with the presence of dementia, although other mental disorders can also lead to abnormal findings on MMSE testing (see Appendix 1C).

3.6.6.1.4 Clinical dementia rating scale.

The Clinical Dementia Rating or CDR was developed at the Memory and Aging Project at Washington University School of Medicine in 1979 for the evaluation of staging severity of dementia. The CDR scale is a 5-point scale that identifies six domains of cognitive and functional performance regarding dementia. In the scale, CDR - 0 connotes no cognitive impairment, and then the remaining four points are for various stages of dementia (CDR - 0.5 = very mild dementia, CDR - 1 = mild, CDR - 2 = moderate, and CDR - 3 = severe). The CDR scale examines: memory, orientation, judgment and problem solving, community affairs, home and hobbies, and personal care. Each category is rated based on a semi-structured interview conducted with the patient and an accompanying reliable source (e.g. spouse, family member) (Morris, 1993) (see Appendix 1D).
3.6.6.1.5 International Second Language Proficiency Rating Scales (ISLPR).

The ISLPR was first developed in 1978 by Wylie and Ingram, and was called the Australian Second Language Proficiency Ratings until being renamed the ISLPR in 1997 to reflect its increasing international status as well as the increasingly international context of its use. For the present study the final version by Wylie and Ingram (2006) was used. The scale is designed to measure general proficiency or practical language skills in real-life language contexts for learners of a second or foreign language. The scale checks four parameters that included, speaking, listening, reading, and writing. Scoring in the scale ranged from zero to five (zero stands for zero proficiency and five stands for native like proficiency). The outcome of the ISLPR was a profile, rather than a result, as each major skill was separately specified (see Appendix 2).

3.6.6.2 Part II: Materials used during data collection phase.

3.6.6.2.1 Material used for obtaining cognitive-linguistic data.

3.6.6.2.1.1 Addenbrooke’s Cognitive Examination Revised (ACE-R).

This is a test for comprehensive assessment of cognitive skills. ACE-R was initially developed in French by Mioshi, Dawson, Mitchell, Arnold, and Hodges, in the year 2006. Krishnan and Lokesh translated this test into Kannada in the year 2010. The test consists of five sub-tests. The sub-tests include five domains checking attention/orientation (18 points), memory (26 points), fluency (14 points), language (26 points) and visuospatial abilities (16 points). The maximum scores for the test are 100 (see Appendix 1B).

3.6.6.2.1.2 Cognitive Linguistic Assessment Protocol (CLAP).

Cognitive linguistic assessment protocol (CLAP; Rajasudhakar & Shyamala, 2005) is a test which assesses the cognitive and linguistic abilities in young and elderly. This test consisted of four domains which included attention, perception & discrimination (60), memory (60), problem solving (60), and organization (60). The maximum scores for the test are 240 (see Appendix 1A).
3.6.6.2.2 Material used for obtaining the data of discourse production.

Two types of discourse samples were collected from the participants. They included, picture description and conversation genre.

3.6.6.2.2.1 Picture description.

For the picture description task, two coloured pictures ‘a village’ and ‘a city centre’ were used. The pictures were 12 x 8 inches in dimensions. The pictures can be found in Appendix 3A and 3B.

All the participants were instructed to describe the events happening in the pictures, they were asked to name all the contents in the picture and describe the same from left side to right side in an order.

3.6.6.2.2.2 Conversation.

For the conversation task, two topics were selected. The first one being the arrangements to be made for a marriage, and the second one is the differences in present generation as compared to that of previous generation. Instructions provided to the participants were as follow.

Topic1: Wedding plans.

Instruction: “Imagine that there is a wedding in the family of a close relative which is going to take place in a month. Think about all the work you will have to do for the same, such as what are the purchases you make, arrangements to be done regarding food clothing, guests etc. I want you to tell me all your plans until I ask you to stop after few minutes.”

Topic 2: Generation gap

Instruction: “You are above 60 years now and you would have found some differences in the present generation as compared to yours. Please tell me about those differences. It could be in any sector. Also I would want to know your opinion about these changes”.
3.6.6.3 Part III: Materials used while analyzing discourse samples.

3.6.6.3.1 Measures of lexical richness.

Three measures of the richness of vocabulary/lexical richness measures were used in the study. They include type token ratio (TTR), Brunet's index (W) and Honore's Statistic (R).

3.6.6.3.1.1 Type token ratio (TTR).

TTR represents the ratio of the number of lexical words (V) to the total number of tokens (N) (Williamson, 2009). It is a measure of vocabulary size, which is generally found to correlate with the length of text sampled (N).

3.6.6.3.1.2 Brunet's index (W).

Brunet's index was included because it quantifies lexical richness without being sensitive to text length (Brunet, 1978). It is calculated according to the following equation: \( W = N V^{-0.165} \) where \( N \) is the number of lexical words and \( V \) is the total number of tokens used by the participant.

3.6.6.3.1.3 Honore's Statistic (R).

Honore's Statistic (Honore, 1979), is calculated based on the formula \( R = 100 \log \frac{N}{(1-V_1/V)} \) where, \( R \) is the Honore's Statistic, \( N \) is the total number of tokens, \( V_1 \) is the words spoken only once and \( V \) is the number of lexical words. The lexical words were underlined in each of the samples based on Williamson (2009).

3.6.6.3.2 T-unit based analysis.

For the T-unit based analysis the video recorded data was transcribed verbatim, with verification for accuracy. The basic unit for segmenting the data was the T-unit (as mentioned in SALT software) which is similar to P-unit (phonological units; Miller, 2004), and is described as an utterance that includes a complete thought (Kemeny, 2007). This division relies mostly upon prosodic features to determine when the utterance is complete. Further division of T-units were calculated according to Hunt (1965) under...
different parameters such as, number of clauses (NOC), number of T-units (NOT), number of clauses per T-unit (NCPTU), number of words per T-unit (NWPTU), number of words per clause (NWPC), number of irrelevant T-units (NITU), and number of irrelevant clauses (NIC), and number of incomplete clause (NOIC). The operational definition for a clause is a minimal meaningful unit of a sentence in the present study.

3.6.6.3 Discourse Assessment Scale.
Discourse Assessment Scale given by Hema and Shyamala (2008) was employed for qualitative rating of the discourse samples. The scale has separate ratings for picture description and conversation. It measures the propositional and non-propositional aspects of conversation and picture descriptions. The propositional aspects of discourse includes, discourse structure, communication intent, topic management, information adequacy, information content, message accuracy, coherence, linguistic non-fluency, speech styles, intonational contour, gaze efficiency and response delay. The non-propositional (interactional) aspects of communication includes, turn taking, conversational repair and revision behaviours. These parameters have been described and statements are framed to rate the same. Further details about this scale can be found in the Appendix 4A and 4B.

3.6.6.4 Software used in the present study.
3.6.6.4.1 Systematic Analysis of Language Transcripts (SALT).
SALT is a language sampling tool developed by Miller & Chapman, (1981) and used by Speech and Language Pathologists. SALT can help to determine the existence of a handicapping condition in expressive language production.

3.6.6.4.2 Statistical Package for Social Sciences (SPSS).
SPSS is a comprehensive and flexible statistical analysis and data management solution. For the present study SPSS version 18.0 was employed.
3.7 Procedure

3.7.1 Part I: Pre-data collection.

3.7.1.1 Informed consent.

The certificate of consent consisted of written statement in first person, in bold. The statement was, “I have read the foregoing information or it has been read to me. I have had the opportunity to ask questions about it and any questions that I have asked have been answered to my satisfaction. I consent voluntarily to participate as a participant in this research”. Researcher as well as participants signed in the consent form. The contact details of participants were noted in the consent form.

3.7.1.2 History.

All the participants were interviewed individually and the general history was taken. The participants were made to sit in front of the examiner. Interviews were question and answer sessions. General history included the demographic details of the participants, education history, language history, medical history & present health status and any other associated problems.

3.7.1.3 Assessing language proficiency using ISLPR.

ISLPR was administered for all the participants. It was administered in Kannada for monolingual participants. The same was administered both in Kannada and English for the bilingual participants. The rules of ISLPR were followed and the four domains viz, speaking, reading, writing and listening were checked. The scores obtained were tabulated separately for monolinguals and bilinguals. The table 3.3 shows the scores obtained on ISLPR for all the monolingual participants for Kannada. The table 3.4 shows the scores obtained on ISLPR for all the bilingual participants for Kannada and English.
### Table 3.3

**Scores of ISLPR for the monolingual participants for Kannada.**

<table>
<thead>
<tr>
<th>Participants/ Parameters</th>
<th>Speaking</th>
<th>Listening</th>
<th>Reading</th>
<th>Writing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monolingual HE (range)</td>
<td>4+ to 5</td>
<td>4+ to 5</td>
<td>4+ to 5</td>
<td>4 to 4+</td>
</tr>
<tr>
<td>(30 participants)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>4+</td>
<td>4</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>4+</td>
<td>4</td>
<td>5</td>
<td>4+</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>4+</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>4+</td>
<td>4+</td>
<td>4+</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>4+</td>
<td>4+</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>4+</td>
<td>4</td>
<td>5</td>
<td>4+</td>
</tr>
<tr>
<td>7</td>
<td>4+</td>
<td>4</td>
<td>5</td>
<td>4+</td>
</tr>
<tr>
<td>8</td>
<td>5</td>
<td>4+</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>9</td>
<td>4+</td>
<td>4</td>
<td>4+</td>
<td>4+</td>
</tr>
<tr>
<td>10</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>4+</td>
</tr>
</tbody>
</table>

**Notes.**

HE = healthy elderly, PWD = persons with dementia, K = Kannada, E = English, 4 = vocational proficiency, 4+ = advanced vocational proficiency, 5 = native like proficiency.

### Table 3.4

**Scores of ISLPR for the bilingual participants for Kannada and English.**

<table>
<thead>
<tr>
<th>Participants/ parameters</th>
<th>Speaking K</th>
<th>Listening K</th>
<th>Reading K</th>
<th>Writing K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilingual HE (range)</td>
<td>4+ to 5</td>
<td>4+ to 5</td>
<td>4+ to 5</td>
<td>4 to 4+</td>
</tr>
<tr>
<td>(30 participants)</td>
<td>5</td>
<td>4+</td>
<td>5</td>
<td>4+</td>
</tr>
<tr>
<td>11</td>
<td>4+</td>
<td>5</td>
<td>4+</td>
<td>4</td>
</tr>
<tr>
<td>12</td>
<td>5</td>
<td>4+</td>
<td>4+</td>
<td>4</td>
</tr>
<tr>
<td>13</td>
<td>5</td>
<td>4+</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>14</td>
<td>5</td>
<td>4+</td>
<td>4</td>
<td>4+</td>
</tr>
<tr>
<td>15</td>
<td>4+</td>
<td>4+</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>16</td>
<td>5</td>
<td>4</td>
<td>4+</td>
<td>5</td>
</tr>
<tr>
<td>17</td>
<td>5</td>
<td>4+</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>18</td>
<td>5</td>
<td>4+</td>
<td>4</td>
<td>4+</td>
</tr>
<tr>
<td>19</td>
<td>4+</td>
<td>5</td>
<td>4+</td>
<td>4</td>
</tr>
<tr>
<td>20</td>
<td>5</td>
<td>4</td>
<td>4+</td>
<td>5</td>
</tr>
</tbody>
</table>

**Notes.**

HE = healthy elderly, PWD = persons with dementia, K = Kannada, E = English, 4 = vocational proficiency, 4+ = advanced vocational proficiency, 5 = native like proficiency.
3.7.1.4 Clinical dementia rating scale.

CDR scale was administered to the participants in the clinical group and the scores obtained are depicted in table 3.1 along with the demographic and neurological details.

3.7.1.5 Mini Mental Status Examination.

MMSE was administered in Kannada to the participants in both clinical and non-clinical groups. The table 3.5 shows the scores obtained on MMSE for all the monolingual participants and table 3.6 for the bilingual participants.

Table 3.5

Scores obtained on MMSE for all the monolingual participants.

<table>
<thead>
<tr>
<th>Participants/parameters of MMSE</th>
<th>Orientation (10)</th>
<th>Registration (3)</th>
<th>Attention &amp; Calculation (5)</th>
<th>Recall (3)</th>
<th>Language &amp; Praxis (9)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal monolingual (N = 30)</td>
<td>10</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>9</td>
<td>28</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>7.5</td>
<td>18.5</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td>1</td>
<td>7</td>
<td>21</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>7</td>
<td>17</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>7</td>
<td>19</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>8</td>
<td>19</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>7</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>7.5</td>
<td>19.5</td>
</tr>
<tr>
<td>8</td>
<td>6</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>7.5</td>
<td>18.5</td>
</tr>
<tr>
<td>9</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>10</td>
<td>6</td>
<td>3</td>
<td>5</td>
<td>0</td>
<td>7</td>
<td>21</td>
</tr>
</tbody>
</table>

Notes.

N = number of participants, 1 to 10 = monolingual persons with dementia.
Table 3.6

Scores obtained on MMSE for all the bilingual participants.

<table>
<thead>
<tr>
<th>Participants/parameters of MMSE</th>
<th>Orientation (10)</th>
<th>Registration (3)</th>
<th>Attention &amp; Calculation (5)</th>
<th>Recall (3)</th>
<th>Language &amp; Praxis (9)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal bilingual (N = 30)</td>
<td>10</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>9</td>
<td>29</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>8</td>
<td>21</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>7</td>
<td>21</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>7.5</td>
<td>20.5</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>7.5</td>
<td>21.5</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>7</td>
<td>20</td>
</tr>
<tr>
<td>8</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>7.5</td>
<td>19.5</td>
</tr>
<tr>
<td>9</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>7</td>
<td>19</td>
</tr>
<tr>
<td>10</td>
<td>6</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>7.5</td>
<td>20.5</td>
</tr>
</tbody>
</table>

Notes.

N = number of participants, 1 to 10 = monolingual persons with dementia.

3.7.2 Part II: Data collection.

3.7.2.1 Phase I: Testing the cognitive linguistic abilities.

In the present study two tests of cognitive linguistic assessment were employed. They included ACE-R and CLAP. ACE-R is commonly used in assessment of dementia and hence was incorporated in this study. Unfortunately ACE-R alone cannot be used to examine many aspects of language skills (other than naming and verbal fluency). Hence CLAP was utilized in this study as this test helps to gather data on many aspects of cognitive-linguistic features.
3.7.2.1 Section I: Testing the cognitive linguistic abilities using Addenbrooke’s Cognitive Examination Revised (ACE-R, Indian adaptation by Krishnan & Lokesh, 2010).

ACE-R was administered to the participants. The instruction and the administration procedure is depicted in table 3.7. Testing duration was 20-25 minutes.

Table 3.7

*Instructions and the administration procedure of ACE-R.*

<table>
<thead>
<tr>
<th>Sl no.</th>
<th>Domain</th>
<th>Instruction</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>ORIENTATION</td>
<td>“What is the day/date/month/year/and season?”</td>
<td>= 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Which is the building/floor/town/state/country?”</td>
<td>= 5</td>
</tr>
<tr>
<td>2.</td>
<td>REGISTRATION</td>
<td>“I’m going to give you three words and I’d like you to repeat after me: lemon, key and ball’. After subject repeats, say ‘Try to remember them because I’m going to ask you later”.'</td>
<td>= 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E. g: [nimbehaŋtı], [chenqu] &amp; [bi:gadkai]</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>ATTENTION &amp; CONCENTRATION</td>
<td>“Could you take 7 away from a 100?” After the subject responds, ask him or her to take away another 7 to a total of 5 subtractions. OR “Could you please spell WORLD for me?” Then ask him/her to spell it backwards.</td>
<td>= 5</td>
</tr>
<tr>
<td>4.</td>
<td>MEMORY</td>
<td>Memory- Recall</td>
<td>= 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Anterograde Memory</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>“I’m going to give you a name and address and I'd like you to repeat after me. We’ll be doing that 3 times, so you have a chance to learn it. I’ll be asking you later”.”</td>
<td>= 7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E. g: “Sundara Murthy 73, Narayanashashtri road Gandhinagar Bangalore”</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Retrograde Memory</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>“I am going to ask you simple questions could you</td>
<td></td>
</tr>
</tbody>
</table>
please answer in single words.”
E. g: Name of current prime Minister.

= 4

5. **FLUENCY**

**Letters**
“I’m going to give you a letter of the alphabet and I’d like you to generate as many words as you can beginning with that letter, but not names of people or places. Are you ready? You’ve got a minute and the letter is ‘P’.”

= 7

**Animals**
“Now can you name as many animals as possible, beginning with any letter?”

= 7

6. **LANGUAGE**

**Spontaneous speech**
Observe the subjects spontaneous speech and record the fluency, paraphasias and word-finding difficulties.

**Comprehension**
Show the written instruction: “*Close your eyes*”

= 1

**Writing**
“Could you please write a sentence”

= 1

**Repetition**
“Could you please repeat after me”

**Word**
E. g: [dura:lo:cane]

= 2

**Phrase**
E. g: [ a:che i:che ]

= 1

**Sentence**
E. g: [ mu:rti chikkada:daru ki:rti doɖɖadu]

= 1

**Naming**
“Please name the following pictures”.

= 12

**Comprehension**
“Using the pictures please point appropriate to the statement which I say”.

E. g., “Point to the one which is associated with the monarchy”.(He has to point to_______)

= 4

**Reading**
“Please read the following items”
E. g., ‘Sew’

= 1

7. **VISUOSPATIAL ABILITIES**
Method

Perceptual Abilities

“Please copy the following figures”
Overlapping pentagons = 1
Cube = 2

“Could you please draw a clock face with numbers and the hands at ten past five”? = 5

“Could you please count the dots without pointing to them”? = 4

“Could you please identify the following letters”? = 4

“Now tell me what you remember of that name and address we were repeating at the beginning”. = 7

Memory Recall

“Okay, I’ll give some hints: was the same X,Y,Z?” and = 5
so on.

Memory Recognition

3.7.2.1.2 Section II: Testing the cognitive linguistic abilities using Cognitive linguistic assessment protocol (CLAP; Rajasudhakar & Shyamala, 2005).

CLAP was administered to the participants and the table 3.8 shows the complete procedure and instructions involved for this tests.

Table 3.8

Instructions and the administration procedure of CLAP.

<table>
<thead>
<tr>
<th>Sl no.</th>
<th>Domain</th>
<th>Subtest, instruction and items</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>ATTENTION, PERCEPTION &amp; DISCRIMINATION</td>
<td>Visual</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>a. Letter Cancellation</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Could you please cancel letter ‘[la]’”?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. Contingent letter cancellation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Could you please cancel letter ‘[ka]’ adjacent to letter ‘[i]’”?</td>
<td>10</td>
</tr>
</tbody>
</table>

79
Method

c. Word Cancellation

“Could you please cancel the word [kittale]?”

Auditory

a. Sound count

“Now I will read a few letters tell me how many times you hear the letter ‘[ba]’."

b. Letter pair discrimination

“I will now tell you a pair of letters; you have to tell me whether they are same or different.”

E. g: ‘[ka] and [ga]

c. Word pair discrimination

“I will now tell you paired words, you have to tell me whether they are same or different.”

E. g: ‘[ma]e[ and [male].

d. Months backward naming

“Tell me the names of months in the reverse order.”

2. MEMORY

Episodic

a. Orientation and recent memory questions

“Now I will ask you a few questions and you have to answer them please”

E. g: [nimma] [hesar:nu]?

b. Digit forward

“I will read a few numbers and you please repeat them after me.”

E. g: 5 8 7 2

c. Digit backward

“I will read few numbers please repeat them after me in the reverse order.”

E. g: 6 3 5 9
Method

Semantic

a. Coordinate naming
   “Name 5 items used in writing” = 5
b. Superordinate naming
   “Name the group to which the following words belong to.” = 5
c. Word naming fluency
   “I will tell you a letter; name 5 words starting from that letter.” = 5
d. Generative naming
   “I will ask you few questions, you need to answer them.” = 5
e. Sentence repetition
   “I will tell you few sentences, please repeat them after me.” = 10
f. Carryout commands
   “I will say few commands; you may please carry out those commands.” = 10

3. PROBLEM SOLVING

a. Sentence disambiguation
   “I will tell you few sentences, they contain meanings, and you are supposed to tell the meanings.” = 10
b. Sentence formulation
   “I will give you some words. With these words make the simplest and shortest sentence possible.” = 5
c. Predicting outcome
   “I will describe a situation, and you tell me what you would do, if..........” = 10
d. Compare and contrast
   “I’ll name 2 items, and you please tell me how they are alike and then how they are different. Be as detailed as possible.” = 10
e. Predicting cause
   “I’ll give you an outcome, and you tell me all of the possible causes for it.” = 5
f. Why questions
   “I’ll ask you a question, and you answer it as completely as possible.”
g. Sequential analysis
   “I’ll give you a task. I want you to tell me all of the steps needed to complete the task from the beginning till the end.” = 10
**Method**

### 4. ANALOGIES

| a. Categorization | “I will now name you an item, given below are few items, please name 2 among them which match with the item I named in the beginning.” |
| b. Analogies | “I will read two words which are related to each other. You have to tell me the related one for the third word I read for you. Note that the relation is similar to the initial two words.” |
| c. Sequencing events | “Here are few events which are placed in wrong order. You have to arrange these sentences in a correct order.” |

### 3.7.2.2 Phase II: Obtaining discourse sample.

All the participants were provided prior notice that the discourse samples will be video recorded and the recording will be started when they will be ready for the same.

#### 3.7.2.2.1 Picture description.

Two coloured pictures ‘a village’ and ‘a city centre’ of 12 x 8 inches in dimensions were used for obtaining discourse sample on picture description. The pictures were 12 x 8 inches in dimensions. The pictures are attached in appendix 3A and 3B. Instruction was provided to the participants which is as follows.

*Instruction: “I will show you the coloured pictures. I would want you to name all the contents in the picture and explain what is happening in the same from right to left corner of the picture. I would want you to explain in sentences.”*

#### 3.7.2.2.2 Conversation.

For the conversation task, two topics were selected (‘Wedding plans’ and ‘Generation gap’). Instructions provided to the participants were as follows.
**Method**

*Topic 1: Wedding plans.*

*Instruction:* “Imagine that there is a wedding in the family of a close relative which is going to take place in a month. Think about all the work you will have to do for the same, such as what are the purchases you make, arrangements to be done regarding food clothing, guests etc. I want you to tell me all your plans until I ask you to stop after few minutes.”

*Topic 2: Generation gap.*

*Instruction:* “You are above 60 years now and you would have found some differences in the present generation as compared to yours. Please tell me about those differences. It could be in any sector. Also I would want to know your opinion about these changes”.

All the participants were subjected to a semi structured interview in which they were encouraged to speak about these topics. Participants were asked open ended questions, which did not restrict or inhibit either the extent or the nature of their responses. Responses were not corrected by the interviewer and no stimulus or interruption was provided, unless the participants were clearly distressed with their inability to respond. Questions were asked slowly and repeated or reworded as found necessary. Each interview session was video recorded with a Handycam (Sony digital recorder H302233). Interviews lasted between 15-25 minutes allowing as much as time was required to collect at least 700 words (arbitrarily determined for the study) of conversation from each participant.

3.7.3 **Part III: Analyzing discourse samples.**

The score obtained from ACE-R and CLAP was tabulated. Analysis of the samples related to picture description and conversation were done as follows to arrive at quantitative data.
3.7.3.1 Transcription of discourse samples.

Video recorded discourse samples (of picture description and conversation) were transcribed before subjecting them for analysis. Interviews were transcribed using IPA (International Phonetic Alphabets, 2005) rules. Only words spoken by the participants were transcribed. Initially all words were transcribed exactly as they had been spoken, including repetitions, incomplete words, interjections, paraphasias and mispronunciations. Subsequently, the discourses were rephrased deleting repetition, incomplete words and interjections which were therefore not counted for analysis. Stereotypical set phrases such as, “ninig gotta” (you know) “alvamma” (right girl?) were excluded, because such expressions were not acceptable as proper clauses or full sentences. Numbers were transcribed as words. Multiple attempts at the same word were only recorded once.

3.7.3.2 Quantitative analysis of Picture description.

Quantitative analysis of picture description was performed using three measures of lexical richness: type token ratio (TTR)/ lexical density of speech (LDS), Brunet's index (W) and Honore's Statistic (R).

3.7.3.2.1 Extracting lexical words

The transcribed discourse was used for extracting lexical words in Kannada based on Williamson (2009) for picture description task. Lexical words considered here are the lexical units in abstraction from the specific form it takes in a particular construction in the discourse. For example the word [halli] in abstraction from the various word forms [hallija], [hallijalli], [hallijinda] etc. Pronouns and numerical words were not considered as lexical words. 10% of this data was rechecked by two experienced linguists for the calculation of N (total text length), V (total lexical words) and V1 (words spoken only once). The lexical words were extracted from the 60 transcribed samples and checked for
repetitions. An example (example 1) of a discourse sample for a picture description is as follows which is further followed by translation of the same.

3.7.3.2.2 Example 1. Discourse sample elicited on picture description.

[itu] [sa:ma:na:java:da] [hali] [cita]. [idrali] [kelvi] [janarga:lu] [tamma] [tamma] [ka:rga:allii] [tu:ga:idda:re]. [uda:ran(e)] [ivella] [gu:lisalaga:l]. [gu:lisalina] [munde] [makka] [a:la] [a:quatida:re]. [adra] [jotege] [ondu] [ga:li] [ide]. [adra] [pakkadalli] [ibu] [he:nnumakka] [ni:ranu] [se:du:idda:re]. [obba] [he:nnumagala] [taleme:le] [ko:da] [ide]. [adara] [pakkadalli] [ondu] [na:ji] [ide]. [adara] [pakkadalli] [obba] [raita] [battavannu] [kli:n] [ma:qtajidda:ne]. [adara] [pakkadalli] [batta] [tumbida] [mu:lega:le]. [illi] [bandre] [ibu] [hengusru] [manege] [ni:rnna] [tegi:konde] [ho:gtajiddare]. [adar] [pakkadalli] [na:gapange] [hali] [hengusru] [pu:je] [ma:qtajiddare]. [adru] [pakkadalli] [hengusru] [hasu] [karitajiddare]. [innond] [karu] [hasuvini] [ha:li] [ku:di:tajide]. [illi] [erdu] [a:quge:la:ve]. [adru] [pakkadalla] [ondu] [ga:di] [ide]. [adru] [paka] [erdu] [gu:disluga:la:ve]. [illi] [ettu] [malgide]. [illi] [ko:jagala:ve]. [illi] [ko:li] [muccodu] [ondu] [buftijide]. [illi] [me:lgade] [pakfogalu] [ha:ra:qtajive]. [gidagala:ve] [illi].

Transcription is based on International Phonetic Alphabet revised, 2005 (see Appendix 8). Since it is phonetic transcription, it is enclosed within the brackets. In the example 1, \( N \) (total text length) = 113, \( V \) (total lexical words; words which are underlined) = 72, \( V1 \) (words spoken only once among the underlined words) = 41.

3.7.3.2.3 Translation of the picture description.

This is a usual village scene. In this few people are engaged in their daily routine. For example, these are all huts. Children are playing in front of the village. They have a wheel. Two women are drawing water from the well. One woman is carrying a pot on her head. Another woman is trying to lift the bucket. There is a pot next to her. There is a dog beside that. A farmer is cleaning the grains. There are bags of paddy next to him. Here
are two women carrying water to their houses. Two women are praying. A woman is milking a cow. A calf is drinking milk from a cow. There are two goats. There is a bullock cart. There are two huts beside the cart. An ox is sleeping on the ground. Here are few hens. And there is a hen basket beside them. There are birds flying in the sky. Here are plants.

3.7.3.2.4 Building the corpora.

The lexical words were extracted from the 60 transcribed samples of healthy elderly and checked for repetitions. The finalized list was saved in the vocabulary bank of the SALT (Systematic Analysis of Language Transcripts) software. The corpus was thus built.

Once the corpus was built, the transcriptions were tagged and saved in the SALT software. The tagging process involved separation of bound morphemes in the lexicon (E.g., [-gaɭu], [-inda], [-ige], [-ja], [-ja:da] etc.). The tagged samples were fed into the SALT software after the completion of the information sheet.

The discourse samples were checked for the errors using the ‘analyze’ option in the SALT. The number of lexicons (V and V1) was obtained using the option, ‘standard word list’ in the toolbar. Following this, three measures of lexical richness were calculated employing the respective formulae (TTR, BI and HS).

3.7.3.3 Quantitative analysis of Conversational discourse.

The basic unit for segmenting the conversation data was the T-unit (as mentioned in SALT software) which is similar to P-unit (phonological units; Miller, 2004), and is described as an utterance that includes a complete thought (Kemeny, 2007). This division relies mostly on the prosodic features to determine where an utterance is complete or not. Further division of T-units were calculated according to Hunt (1967) under different parameters such as, number of clauses (NOC), number of T-units (NOT), number of clauses per T-unit (NCPTU), number of words per T-unit (NWPTU), number of words
per clause (NWPC), number of irrelevant T-units (NITU), and number of irrelevant clauses (NIC), and number of incomplete clause (NOIC). A clause is a meaningful unit of a sentence in the present study. It can vary from two words to five words. An example (example 2) of division of clauses and T-units is as follows. 10% of the data was checked for inter-judge reliability rating.

3.7.3.3.1 Example 2. Division of clauses and T-units for a part of discourse related to conversation.

[nam] [mag[u] [madve] [ide].
[inond] [ting[alli]
[lagna] [fiks] [aː:gide].
[aː] [madve] [naːqibe]:kaː:gide].

Our daughter’s wedding is there.
In a month.
Marriage is fixed.
We should celebrate the wedding.

[so] [naːviː:gEn] [maːqidvi]
[fast] [hoːgi]
[naːvu] [huːgsun] [maneg] [hoːgi],
[varan] [tande] [taːji] [maːtaːqsi]
[avratra] [hoːgi],
[jaːv] [dːeːːtːe] [madve] [fiks] [aːːgide]
[anta] [maːtaːqkonː] [barbːEku].

So what we did was,
First we went
To the bride groom’s house,
Spoke to his parents,
Went to them,
For which date it is fixed
We spoke about it.

[adaːdmeːle] [avru] [koːqo] [vicaːra]
After that, the giving and taking talks happened.
What should be given to the bride?
What should be given to the bridegroom?
Hence spoke about these issues.
We fixed the date and came.

After the date was fixed,
Now-a-days
Wedding cannot take place in a house.
So what we did was,
Some function hall or so
Booked for rent
We paid the advance for the same.

(Each line represents a clause and each paragraph represents a T-unit in the example 2).

3.7.3.4 Qualitative analysis of discourse samples.

The picture description and conversation sample were subjected to qualitative analysis using the Discourse assessment scale developed by Hema and Shyamala (2008) (see Appendix 4A & 4B). Three judges including the experimenter rated the samples. All the judges were post graduates in Speech-language pathology. The rating scale consisted
of uniform rating of 0, 1 and 2 where '0' represented the behaviours that were completely present, '1' represented behaviours that were partially present and '2' when the behaviours were absent. The parameters on 'gaze inefficiency' and 'delay in responding' had different ratings which were self-explanatory.

3.7.3.4.1 Trial rating phase

Before the actual rating, the judges employed for rating the performances of PWD were first familiarized with the terms/parameters used in the scale and the behaviours observed in the discourse samples in the trial rating phase. For this purpose, three discourse samples were used and simultaneous rating was carried out by all the three judges.

Each discourse sample was rated in a separate scoring sheet. The judges were seated in front of a HP computer (INA103SGVX) with HP headphones in a considerably quiet room. The picture description and conversations were rated separately. After the completion of the rating, the score sheets were gathered and the ratings were entered and tabulated. The scores obtained from quantitative and qualitative analyses of discourse were subjected to appropriate statistical analyses along with the scores of ACE-R and CLAP using SPSS 18.0 (Statistical Package for Social Sciences, version 18).