

**VALIDATION OF DISCOURSE ANALYSIS SCALE IN ADULTS WITH
DEMENTIA**

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Abstract

There is a need to assess the correlation which teases out the exact relationship between discourse and cognition in Dementia. The language decline is accompanied with the decline in other cognitive domains in contrast to the language breakdown seen in aphasia. Hence, individuals with Dementia need discourse assessment in the context of their affected cognitive domain (Almor, Kempler, MacDonald, Andersen & Tyler, 1999). Therefore process of validation of the Discourse Analysis Scale in population with Dementia might show that the role of cognition in discourse production might partly be determined by the context in which communication takes place or the type of pathology the individuals are diagnosed with. Thus, the present study was aimed to validate the existing Discourse Analysis Scale in Adults with Dementia. A total of 40 adults with dementia in the age range of 40 and above years were considered with the objectives like, 1) Validate Discourse Analysis Scale (DAS) on individuals with Dementia exhibiting cognitive communicative deficits. 2) Evaluate the effectiveness of DAS in assessment of discourse of individuals with Dementia. 3) Evaluate the effectiveness of DAS by discussing the co-relation between discourse abilities and the underlying cognitive functions. Conversation abilities of individual with dementia significantly varied with narration and picture description tasks, where performance in narration and picture description tasks was relatively poorer than conversation task. Further, on comparing narrative abilities and picture description task, the overall performance in narration was better compared to picture description task. Hence, poorest performance was noted in picture description task. These differences in performance by individuals with dementia can be attributed to factors like: varied nature and complexity in the tasks, varied cognitive load (working memory & episodic memory), executive functioning, word retrieval deficits, abstract thinking and reasoning, visual perception deficits, deficits in planning, programming, organization and cognitive flexibility and neuropsychological changes in dementia. Thus, the subtle changes in discourse parameter can be better identified through comprehensive analysis of a spoken discourse that sufficiently triggers the cognitive system.

Key word: Working memory, Episodic Memory, Genre, cognitive flexibility

CHAPTER 1

INTRODUCTION

Neurological Insults is very common diagnosis, but with the medical name of neurological insults people would not recognize them. In order to define the same, the Brain Injury Association Board of Directors has made an attempt in 1997. According to this board, the definition of acquired brain injury can be adopted to expand with various conditions other than trauma being the cause for brain injury. After birth any injury to the brain is an acquired brain injury (ABI). The resultant will be the variation in neuronal activities which influence positively or negatively the functional ability of the cell or the metabolic activity and physical integrity. This acquired brain injury can be due to various conditions caused by various factors like (1). *Traumatic brain injury* with and without skull fracture caused when an external forces is applied to the head and/or neck, (2). *Hemorrhage, cardiopulmonary arrest, airway obstruction and carbon monoxide poisoning* lead by hypoxic/anoxic injury, (3). *Arteriovenous malformation, fat emboli, thromboembolic events* lead by vascular disruption during intracranial surgery, (4). *hypo/hyperglycemia, uremic encephalopathy, hepatic encephalopathy* caused due to intracranial neoplasms, infectious diseases, metabolic disorders. (5). Seizure disorders and toxic exposure. Every year, 1.7 million people are diagnosed with a Neurological Insult; of those 1.7 million, 52 thousand die, 275 thousand are admitted to the hospital, and 1.365 million are treated in the ER (Cournoyer, 2012). Neurological Insults are among one of the most common injury related deaths and disabilities in the United States, which occurs in all ages, races, societies, and revenues (Coronado, McGuire, Sarmiento, Bell, Lionbarger, Jones, & Xu, 2012).

There are two types of brain injuries that are classified as traumatic and non-traumatic Neurological Insults. *Traumatic Neurological Insults* includes traumatic brain injury (TBI). TBI is a brain injury that is a result of trauma; it has two different diagnosis which are diffuse axonal and contusions. Through a traumatic Neurological Insult the diffuse axonal injury is the most common type of Neurological Insult that is diagnosed. It is a contusion that occurs when there is bruising of the brain tissue at the site of the fractures known as coup. A diffuse axonal injury happens when parts of the brain have moved because of impact to the skull (Johnson, Stewart & Smith, 2013). When the brain is swelling in a particular area that causes bleeding to the brain tissue is called contusion to the brain. A contusion is more commonly diagnosed than a concussion. An outcome to a contusion depends on how extreme the injury is. With no medical interference the minor contusions are able to heal on their own, while the herniation of brain is caused by severe contusions, and eventually coma. Yearly death rates of a cerebral contusion vary with age, but increase with an increase in age. Mortality rates do decrease after the first year, which is very dangerous for infants (Luo, Hawkey, Waite & Cacioppo, 2012).

A *Non-traumatic Neurological Insults* is one that is not caused by a trauma, but caused from poisoning, a tumor, infections (encephalitis or meningitis), degenerative disease, or cell toxicity. These types of non-traumatic brain injuries occur through strokes, heart

attacks, near-drowning experiences, strangulation, a diabetic coma, poisoning or other chemical causes. These degenerative conditions include Alzheimer's or Parkinson's disease (BIC, 2011). A non-traumatic injury is one in which there are no cuts or broken bones involved. According to the Brain Injury Center of America, any injury to the brain that does not result from Non-traumatic injury does not injure the brain using physical force, but rather occurs from poisoning, a tumor, infections or degenerative disease (2011). According to North Eastern Ontario (NEO) Brain Injury Network, types of non-traumatic injuries consist of Meningitis or Encephalitis, Hypoxic Injury, electrolyte imbalance, metabolic disorder, or vascular problems.

These diverse brain insults, including traumatic brain injury and right hemisphere damage, stroke leading to aphasia, infections, and tumors, neurodegenerative diseases causing Parkinson's diseases and dementia, and status epilepticus (SE) or the complex febrile seizures called as prolonged acute symptomatic seizures lead to a condition called cognitive communicative disorder. The brain is one of the most fragile parts of our body so whether or not the patient has a traumatic or non-traumatic brain injury it is still a very serious disease. The problem with Neurological Insult is that people are still suffering from cognitive communicative disorders because the procedures and rehabilitation are not done to the extent they are supposed to be and fully recovering them, or being as minimal as they can be. Here is an attempt to conduct research on these clinical populations with diverse brain insults exhibiting cognitive communicative deficits. Since the cognitive communicative deficits are manifested at discourse level, there is a need to validate the existing Discourse Analysis Scale at conversation, narration and picture description task at least on one condition called Dementia.

Dementia is a neurological condition, which is described as a brain syndrome associated with problems in memory, judgment, language, orientation and executive functioning. *Dementia is a debilitating condition that causes chronic and progressive deterioration in intellect, personality and communication functioning. There are many varied causes of dementia, among them are infections, anoxia, intracranial masses, trauma, toxicity, hearing and visual disorders, vitamin deficiencies, endocrine and metabolic disorders, arteriosclerotic complications and Alzheimer's and other disorders* (Bayles & Kaszniak, 1987).

Dementia is the most common disease in recent past, which predominantly affects older people. Universally the estimated people living with dementias are to be 25 million and in India over 3% of India's population as of 2010 are living with dementia. The prevalence of dementia till date is 33.6 per 1000. Among the various types of dementia, Alzheimer's disease is the most common type (54%) followed by vascular dementia (39%) and 7% of cases are due to causes like infection, tumor and trauma. Thus, understanding dementia is a pressing challenge as societal awareness increases (McParland, Devine, Innes & Gayle, 2012). Among different types of dementias, the most common occurring is Alzheimer's disease, vascular dementia and fronto-temporal dementia, are progressive- ultimately terminal – diseases that affect memory, communication, mood and behavior. Currently there

is no cure for any type of dementia and the evidence- base for the efficacy of the available pharmacological treatments is not particularly strong.

Dementia, not just impairs cognitive skills in the individuals but also the communication skills are hampered. This varies across stages of the disease. There are seven stages of dementia right from mild cognitive decline to very severe cognitive decline Kim and Schulz (2008) classified these seven stages into three stages of dementia to broadly understand the impairment in language abilities. In the mild stage, there are very few errors noted in naming task and the individuals possess difficulties in story level material. However the discourse is usually intact and they can attend to simple single questions. In moderate stage of Dementia, the discourse is usually affected, wherein they possess decreased knowledge of present and recent events. They will not be comprehending certain questions and hence, unable to answer relevantly. They also showcase, naming errors. They need prompting to begin conversation. Marked difficulty is seen in planning & organizing skills. Reduced memory in terms of personal history as well as poor short term memory is noticed. In final stage, that is, severe stage, naming is severely impaired and speech is mostly jargon type. Complete impairment in short term and long term memory. All the cognitive linguistic skills are impaired drastically. Personality changes are significant along with behavioral symptoms. They produce unintelligible speech (Kim & Schulz, 2008).

Hence, the mild stage is more sensitive for the discourse analysis. And significant difference can be evident between healthy elderly and persons with dementia during this stage. Thus, the present study focused on exploring the discourse in individuals with mild dementia.

Discourse analysis was first referred to by the linguist Zellig Harris. In the year 1952, he named his study as 'discourse analysis' after investigating the connectedness of sentences. Procedurally the discourse analysis was a formal methodology which is derived from the methods of linguistic analysis. The linguistic analysis being structural in nature can simplify the text into relationships like equivalence among its constituents at lower level and substitution. Harris's view of discourse held structural so centrally to that he also put forth an argument that the discourse is not just the sentences arranged in a random sequence but the fact is the structure present in it. The segments of discourse occurring and recurring relative to each other represent the pattern of structure.

To add on, the meaning in relation to exterior world is called the reference and the meaning in relation to linguistic system is called the sense. These are the two important factors which influence the sentence's true meaning which is not assigned only by its linguistics construction. This parameter measures how well a speaker's discourse has forethought and organized in terms of the overall plan, theme of topic. It accounts for the correct description of the events before their occurrence.

Discourse analysis is the branch of applied linguistics dealing with the examination of discourse attempts to find patterns in communicative products as well as and their correlation with the circumstances in which they occur, which are not explainable at the grammatical

level (Carter, 1993). Discourse analysis is employed both for written and spoken text. The spoken discourse genres are separated into two broad categories, viz monologic (monologues) and interactive. With reference to monologues, it is further divided into descriptive, procedural, expository, conversational and narrative. Descriptive discourse involves attribution of features and concepts of a given stimulus (e.g., object) or personal experience (e.g., favorite hobby). Narrative discourse involves story telling or event description or typically through generation of a spontaneous story or retelling of a story previously presented. Procedural discourse employs explanations of action sequences to perform a task. And expository discourse involves informing a listener of a topic through facts or interpretation; drawn on higher – level thinking skills (e.g., inferring, understanding cause and effect) (Cherney, 1998).

In contrast, *conversational discourse* is interactive with participants' alternating roles as speaker and listener to exchange ideas, thoughts, and feelings. Conversation is the prevalent mode of human communication and thus it may be argued that it has greater ecologic validity or how well a measure relates to real-life situations than monologic discourse. But monologic discourse also has ecologic validity as everyday conversation often incorporates a narrative framework. Furthermore, storytelling often is embedded in social exchanges (Mar, 2004). Monologic discourse may be more useful clinically than conversational discourse.

Discourse analysis checks on the use of assumed background knowledge of the topic of conversation, cultural knowledge, general knowledge on areas of life, interpersonal knowledge like specific and possible knowledge about the history of the speakers themselves. This information plays a vital role in understanding the meaning of a word. The speaker's meaning is dependent on the assumption of knowledge that is shared by both the speaker and the listener. The speaker constructs the linguistic message and intends a meaning, and the listener interprets the message and infers the meaning (Brown & Yule, 1983; Thomas, 2014; Yule, 1996; Kleinke, 2010). Thus, for speech-language pathologists an important tool to be acknowledged is the discourse analysis. Even though it is not the frequent choice made and used as an assessment tool due to its varied number of options available and apparent time-consuming nature. And the other assessments like the Pragmatic Protocol checklist, the quantitative approach of calculating number of T-units and total words produce make it difficult for the speech-language pathologist to choose as an assessment measures.

The speech-language pathologists as researchers and clinicians are often facing the difficulty in assessing the connected speech of persons with diverse brain insults for example aphasia, right hemisphere damage, dementia, traumatic brain injury and Parkinson's diseases causing cognitive communicative disorder, where the discourse or connected speech is invariably affected. Individuals' cognitive communicative aspects can be assessed in the respective individuals connected speech being conversation, narration and/or picture description. The discourse analysis methods for the connected speech have been developed in both Western and Indian context at both structural and functional levels. The analyses of macro-linguistic and micro-linguistic abilities are under the structural assessment. Microlinguistic level of analysis includes the processing of aspects at lexical-semantic,

syntactic and phonological aspects of sentences where syntactic complexity is measured. The common errors are the semantic or verbal paraphasias or use of indefinite terms, phonological errors, to be specific under syntactic organization the errors are in the use of proportion of complete sentences and syntactic complexity. At macrolinguistic level, the capacity to maintain pragmatic organization and semantic at the suprasentential and conceptual level is analyzed. This is related to the language processing at discourse level which is analyzed in terms of errors of global and local coherence and cohesion. These above mentioned procedures can be employed irrespective of different methods of elicitation of discourse. However, the macro and micro linguistic assessment of discourse also contribute towards the other assessment of discourse processing abilities which generally focus on the ability to convey information which can be listed under the functional approaches. These abilities can be assessed qualitatively or quantitatively. From an attempt of compiling all these discourse variable, Discourse Analysis Scale (Hema & Shyamala, 2013) was formed as a part of Ph D thesis work of the Principal Investigator and the same is standardized as part of ARF project.

Individuals with aphasia, right hemisphere damage, dementia, traumatic brain injury and Parkinson's diseases are the clinical population manifesting cognitive communicative impairment. Discourse abilities in these adults with acquired cerebral pathology have come under closer examination in the last three decades. One such disorder which has caught attention of speech language pathologists is the communication abilities in persons with dementia. Dementia is a debilitating condition that causes chronic and progressive deterioration in intellect, personality and communication functioning (Bayles & Kaszniak, 1897). There are several factors which influence the discourse abilities in persons with dementia. Therefore, there is a need to study discourse in individuals with dementia. Their discourse domain is not completely assessed since it is only a subsection in the existing traditional language tests and cognitive protocols. Hence there is a dire need to validate the existing Discourse Analysis Scale (Hema & Shyamala, 2013) on all these population. Hence, here is an initial attempt to validate on individuals with Dementia.

Both researchers and clinicians are frequently facing the difficulty of how to evaluate the cognitive communicative impairment in the connected speech of persons with diverse brain insults for example aphasia, right hemisphere damage, dementia, traumatic brain injury and Parkinson's diseases causing cognitive communicative disorder, where it is invariably affected. Methods for both structural and functional discourse analysis have been developed in both Western and Indian context. The structural assessment includes the analysis of micro-linguistic and macro-linguistic abilities. The former refers to lexical and morpho-syntactic aspects of language processing and can be analyzed in terms of lexical errors (e.g. phonological errors, verbal or semantic paraphasias or use of indefinite terms) and/or syntactic organization (e.g. proportion of complete sentences, syntactic complexity). Macro linguistic abilities relate to pragmatic and discourse-level aspects of language processing and can be analyzed in terms of errors of cohesion, local and global coherence (e.g. presence of tangential utterances or extraneous propositional content). The functional approaches to discourse processing abilities have mainly focused on the ability to convey information. These abilities can be assessed qualitatively or quantitatively.

Need of the Study

With reference to the individuals with Dementia, there is a need to assess the correlation which teases out the exact relationship between discourse and cognition. According to Ralph et al, 2001, degradation of semantic networks is the main characteristic of individuals with Dementia. Where they exhibit difficulty in confrontation naming and show poor score on semantic verbal fluency on standardized testing (Zakzanis, Leach & Kaplan, 1999). This language decline is accompanied with the decline in other cognitive domains in contrast to the language breakdown seen in aphasia. Hence, individuals with Dementia need discourse assessment in the context of their affected cognitive domain (Almor, Kempler, MacDonald, Andersen & Tyler, 1999).

Therefore process of validation of the Discourse Analysis Scale in population with Dementia might show that the role of cognition in discourse production might partly be determined by the context in which communication takes place or the type of pathology the individuals are diagnosed with. Since, study by March, Pattison and Wales (2009) assessing the interplay between cognition and discourse depends fundamentally on the role of communicative context. Across different discourse genres the correlation between cognition and discourse vary differently. This implements the idea of essential multiple discourse task being a pre-requisite to acknowledge the relation between cognition and discourse which covers the different properties and demands of different communicative context.

Use of Discourse Analysis Scale (DAS) will enable to identify cognitive communicative deficits in clinical population with diverse brain insults despite passing on traditional language tests. DAS will be an advanced test in comparison with the traditional language test which assesses only the basic linguistic competency of any individuals with brain insults. DAS assess discourse in three different genres. DAS is an extensive test of discourse with less effort, follows non-invasive procedure and doesn't require high cost equipments. Cognitive communicative deficits in clinical populations of Adults with Dementia will be made aware of their discourse impairment through this assessment and later facilitate intervention at discourse since they are not aware of their impairment at discourse level. Since cognitive communicative disordered populations "talk better than they communicate", certain cognitive aspects influence communication at discourse level. On administration of discourse analysis scale these cognitive aspects can be outlined. The DAS will be helpful in estimating the prevalence of the cognitive communicative disorders/deficits in Indian population with Dementia. As an initial attempt the present study focus on the validation of DAS on individuals with Dementia.

CHAPTER II

REVIEW OF LITERATURE

Dementia refers to brain syndrome characterized by problems in memory, judgment, language, orientation and executive functioning. Alzheimer's disease is the most common cause of dementia, but other causes are also noted to lead to dementia, namely; strokes, Parkinson's disease, head injury or tumors and other conditions which are reversible type. Individuals with Dementia possess at least three of the five major mental activities; Language, Memory, Emotion/ Personality, Visuo-spatial skills and Cognition (abstraction, calculation & judgment) (Cummings & Benson, 1992).

With reference to the prevalence of Dementia, the WHO (World Health Organization) in 2003 has reported 4% of the total population in the world above 65 years is being affected with dementia. This number is predicted to shoot upto 36 million affected with Alzheimer's disease by 2020. Dementia as known is caused by various conditions. The most prevalent condition is Alzheimer's disease which accounts for about 50-69% of all the patients with dementia reported. Around 20% of dementia is caused due to vascular lesions. And 15% of this sample, show symptoms of dementia due to Progressive Supranuclear Palsy (PSP), Cruetfeldt Jacob disease (CJD), Parkinson's disease (PD) and Pick's disease which are known to be irreversible type of Dementia. In these conditions, dementia gradually worsens as documented.

One system of classification of Dementia is based on the site of lesion in brain due to various conditions. Cortical dementia is noted when brain insult is in the cerebral cortex, the outer layers of brain play vital role in cognitive processes such as memory and language. The distinctions between cortical dementia (Pick's disease and Alzheimer's), sub-cortical dementias (supranuclear palsy, Wilson's disease, Parkinson's disease, and Huntington's disease), and vascular dementias or mixed (Korsakoff's syndrome, Creutzfeldt –Jacob disease and MID) is based on the area of lesion according to Whitehouse et al (1986) but fails to account for the relationships between the areas with reference to neuro –chemical and neuropathological point of view. Additionally, this cortical are the primary dementia type and sub cortical are the dementia occurring as a secondary feature of the symptom complex (Cycyk & Wright, 2008). Thus, it provides a distinction at neuro-anatomic organization that is useful in sorting out the syndromes causing dementia.

In the present study, Dementia of Alzheimer's type (DAT) is only considered. Here, the onset of DAT is gradual and it results from diffuse damage in the central nervous system, salient features being formation of granulo-vascular degeneration, neurofibrillary tangles and senile plaques. The disease is irreversible and progressive in nature. With reference to specific components of speech-language impairments phonology and syntax is spared at initial instances, however it is affected at end but at the initial stages the semantics and pragmatics are only impaired. Memory issues are noted the earliest and worsen for remote events. These individuals show consistent level of performance and are usually alert. They are generally normal for their physical characteristics. Other features includes confusion,

difficulty in decision making, difficulty in thinking, language problems, changes in personality problem with abstract thinking, and loss of initiative.

Cognitive Process in Dementia

Cognitive decline is the hallmark in individuals with dementia. This decline varies sometimes across the types of dementia and across stages. The processes usually prone to decline include memory, executive functions, attention & concentration, perception and visuospatial skills. The communication abilities of persons with dementia involve these processes directly or indirectly.

Memory and Dementia

Memory problems are typically the first signs of cognitive decline among individuals with dementia. The memory problems often result in problem behavior which can be explained by failure at different points in memory processing. There were different experimental tasks used to measure memory in persons with dementia. And they measured different types of memory such as working memory, episodic memory, sensory memory etc.

Working memory (WM) is the ability to actively hold information in the mind needed to do complex tasks such as reasoning, comprehension and learning. Working memory tasks are those that require the goal – oriented active monitoring or manipulation of information or behaviors in the face of inferring processes and distractions. Working memory (WM) processes are particularly vulnerable to the effects of dementia which are due to failure in executive control system. There is evidence of reduced memory span and short term memory (STM) capacity in dementia (Morries, 1986). They have increased rate of forgetting (Chan, Shum & Cheung, 2003). They exhibit encoding deficits (Kesner, 1998). They have impairment in the ability to learn performance with cueing (Werheid, Hoppe, Thöne, Müller, Müngersdorf, & von Cramon, 2002).

A study by Belleville, Pertz and Malenfant (1996) has examined patients with Alzheimer's disease, normal elderly, and healthy young adults for their verbal and attentional components of working memory. Persons with Alzheimer's disease were sensitive to word length but showed a reduced attention span. This was an indicative of a functional rehearsal procedure. However, in persons with AD, they showed a depressed performance in tasks of phonological analysis and the effect of phonological similarity on immediate recall was smaller. In the task that assessed the attentional component of working memory there was also a significant decrement. Examination of individual pattern of performance revealed that the phonological deficiency was severe in a subgroup of DAT while the attentional deficit was more general.

These deficits in working memory processes are well documented and portray frontal lobe pathology in persons with DAT. The performance data of persons with mild and moderate expression are discussed by Bayles (2003) in the context of possible contributions from impaired working memory functions. The argument suggested that diminished scores on tests of language comprehension and production result primarily from attenuated span

capacity, difficulty in focusing attention, encoding, and activation of long term knowledge rather than from loss of linguistic knowledge.

Deficits in Episodic Memory (EM) in dementia

Episodic memory refers to memory related to autobiographical events like time, place, associated emotions, and other contextual knowledge. Along with working memory, episodic memory is also affected with respect to disease progression because, it necessitates to encode new information frequently while explaining new events (Caselli & Yangihara, 1991).

In 33 persons with early dementia of Alzheimer's type (DAT) and 30 matched normal, Greene, Baddeley and Hodges (1996) has assessed anterograde episodic memory using immediate and delayed prose recall. The Consortium to Establish a Registry for Alzheimer's Disease (CERAD) word learning test and the test of visual and verbal recall and recognition was used. DAT showed markedly impaired learning on all three measures, with little evidence of accumulation of information across trials. They showed more forgetting than normal on prose recall and the CERAD word list, but more detailed analysis suggested that this differential loss was attributable to the contribution of primary memory to immediate but not delayed recall. It was concluded that the episodic memory deficits in DAT is general in nature and primarily reflects impaired learning rather than accelerated forgetting or disrupted retrieval.

Deficits in Semantic Memory (SM) in dementia.

Semantic memory (SM) refers to the memory of meanings, understandings, and other concept- based knowledge unrelated to specific experiences. This is the process of consciously recollecting the factual information and general knowledge about the world. Semantic memory refers to the enormous storehouse of information that humans have readily accessible.

From the methodological point of view amongst persons with brain damage, Chertkow, Bub, and Seidenberg (1989) has observed issues related to the measurement of semantic memory impairment. Participants considered were individuals with anomia and Dementia of Alzheimer's type. Direct tests of semantic memory and a battery of perceptual tests were used. The first objective was to check the loss of semantic memory reflecting the impaired verbal fluency. The results reveal that the decline in semantic memory store and varied impairment in semantic search are the two variables resulting in poor verbal fluency. Hence, the authors opined that verbal fluency mirrors loss in semantic memory to a certain degree. The second objective was if semantic memory impairment in the DAT confirmed to the 'semantic storage disorder' syndrome and results confirmed DAT to the 'semantic storage disorder' syndrome. It was shown that the DAT demonstrated co-occurrence of consistency of errors, loss of semantic cueing, and preserved superordinate knowledge with loss of detailed knowledge of concept items.

Deficits in Executive Function (EF) in dementia.

In psychology the executive system is a theorized cognitive system that manages and controls other cognitive processes. The process like supervisory attentional system or cognitive control is possible only with the executive function (EF). The components of EF according Assal and Cummings, (2003) are self-monitoring, violating purposive action, manipulating new information, inhibiting incorrect responses, mental set, shifting and planning. Difficulty in performing instrumental activities of daily living is caused by the involvement of EF. Therefore in dementia, with increase severity the performance will be affected at complex tasks and show poor problem solving skill. The earliest signs of EF dysfunction are the initiation and planning problems. Theory of Mind (TOM) or ability to infer what another person knows by taking his/her perspectives is the component of EFTOM deficits concomitant with cognitive impairment in Persons with mild dementia. WM, EF influences the TOM.

This role of executive function (ECF) is examined within dementia syndrome between 307 Alzheimer's disease (AD) and 168 Vascular Dementia (VaD) in comparison with 208 neuro-typical individuals (Voss & Bullock, 2004). Results indicated that on all tests of cognitive functions neurotypical group performed better than other two clinical groups ($p < 0.001$). AD performed poorer than VaD on 11 of the 18 cognitive tests ($p < 0.05$). Factor analysis of patient data indicated the existence of 3 factors generated from the battery of tests, relating to episodic memory, ECF and face recognition. It was primarily on tests of ECF that the AD and VaD groups did not differ significantly. It is concluded that ECF is a feature of cognition shared by the two pathologies, giving rise to an obligation to reconsider the current understanding of the core cognitive feature of dementia.

Attention and Concentration in early stage of Dementia

Attention is the process of focusing on a specific stimulus (selection), for a particular length of time (sustain), attending multiple stimulus (divided or shifting focus from one stimuli to another) (Norman & Shallice, 1986). The complex tasks which require divided attention are listening to a target word in a given list of words. Persons with dementia have difficulty in such tasks (Perry & Hodge, 1999). Whereas in a simple task of attention for selecting and sustaining are not typically impaired in early dementia (Assal & Cummings, 2003). They also have preserved performance on sustained attention. When physical characteristics of the target and environmental stimuli are similar, discrimination skills become challenged with more errors, increased confusion with longer response time (Baddeley, 2001; Hegarty, M., & Waller, 2005). When multiple and competing demands for attention exceed the capacity, reaction time is affected because of difficulty in deciding which task to attend. This is the problem related to inhibitory skills of EF (Baddeley, 2001).

Parasuraman, Greenwood, Haxby and Grady (1992) has studied 15 persons with mild to moderate dementia with Alzheimer's Type (DAT) and examined spatial attention for a letter-discrimination task in comparison with 15 healthy, age matched normal. Spatial cues like (valid, invalid or neutral) were presented either centrally at fixation or peripherally 6.7° to the left or right of fixation. The time duration between cue word and target word was varied between 200ms and 2000ms. Results revealed that there was no difference between the

neurotypical group and DAT group for the reaction time (RT). Conversely, invalid cues RT were significantly greater in the DAT group compared to neurotypical group. Reaction time measure and the consequent advantages were correlated to right –left asymmetry in cerebral glucose metabolism in superior parietal lobe for DAT clients but this was noted in neurotypical individuals. The results showed that in early DAT there was impaired disengagement of visuospatial attention but intact focus of attention to spatial location. This may be linked to the dysfunction of cortico-cortical networks linking the posterior parietal and frontal lobes. Additional explanation was the automatic attention shifts elicited by peripheral cues revealed abnormalities earlier than attention shifts initiated ‘effortfully’ by central cues.

Mosimann, Mather, Wesnes, O’Brien, Burn, and McKeith (2004) quantified object-form perception, space- motion and visual discrimination in persons with Alzheimer disease (AD), Parkinson disease dementia (PDD), and dementia with Lewy bodies (DLB). It was to compare these three groups matched for overall dementia severity and sex and education matched normal groups, and two ages forming a cross-sectional study. Visual perception was globally more impaired in PDD than in normal, but was not different from DLB. Persons with PDD tended to perform worse in all perceptual scores compared to persons with AD. Dementia with Lewy bodies (DLB) and Parkinson disease dementia (PDD) had similar profound visuo-perceptual impairments but for Alzheimer disease it was different.

Abstraction and Problem Solving processes in Dementia

One of the prominent clinical features of dementia of middle stage is the difficulty in shifting or maintaining attention along with impairment in abstract thinking and problem solving (Cummings & Benson, 1992). The known cause for these deficits is the neuropathological changes in the association cortex. The tactile discrimination test was used to study the problem solving impairment by Freedman and Oscar-Berman (1986). Dementia patients showed poor performance in giving alternate responses and shifting mental set which was the resultant of deficient cognitive flexibility.

Visuospatial abilities in Persons with Dementia

Vision is defined as the process of ‘seeing with our eyes’, which gives us a representation of the world around. ‘Perception’ is the process that allows us to provide meaning to the things we see (Jones, et. Al., 2006). Williams (1959) stated that ‘*It is not that the persons with dementia are unable to receive information through his senses, but that they are unable to select or abstract from all the information available that which is relevant*’ sited by Surr, (2006). Persons with dementia experience significant number of ‘visual mistakes’ that are linked to their ‘thinking errors’ which is the combination of ‘seeing-thinking’ illness or ‘visuo-perceptual-cognitive’ illness (GemmaJones & Harding, 2006). Visuospatial dysfunction is also a prominent feature of persons with dementia. These dysfunctions are independent of the lower level of visual functioning. The higher level of visuospatial dysfunctions are evident in persons with dementia on tests of constructional apraxia, including Block- design subtest from the Wechsler Adult Intelligence scale revised (WAIS- R) and drawing tasks (Berg, et. al, 1984; Becker, Huff, Nebes, & Holland, 1988).

Drawing tests usually involve spontaneously drawing to command or copying abstract complex figure, clocks, and two-dimensional representations and of a cube. In addition the persons with dementia have difficulty in visual discrimination and visual- matching tests (Becker, Huff, Nebes, Holland, & Boller, 1988). Persons with dementia exhibit either primarily verbal or visuospatial deficit which correlate with the greater glucose hypometabolism in the left or right hemisphere, respectively (Koss, Friedland, Ober, & Jagust, 1985; Martin, 1987; Becker, Huff, Nebes, & Holland, 1988).

Visuoperceptual disturbance is also examined in persons with Lewy body dementia (DLB) in comparison with that of persons with Alzheimer disease (Mori et. al., 2000). The aim of their study was to investigate the correlation between visuoperceptual disturbance and the vision related cognitive and behavioral symptoms. Twenty-four persons with probable DLB and 48 persons with probable Alzheimer disease were matched to those with DLB for age, sex, education, and Mini- mental State Examination score. In probable DLB the visual perception was defective which plays a role in development of visual hallucinations, delusional misidentifications, visual agnosias, and visuoconstructive disability. These were the characteristic features in DLB.

An attempt is made to quantify the object-form perception, space motion and visual discrimination in persons with Alzheimers diseases (AD), Parkinson Disease Dementia (PDD) and Lewy bodies (DLB) (Mosimann, Mather, O'Brien et. al., 2004). These groups were matched for overall dementia severity, education, sex and age matched with neuro-typical individuals. The result of this cross sectional study was visual perception being globally impaired in ADD than neuro-typical and similarly impaired in DLB. Persons with PDD performed very poor in all the perceptual tasks compared to AD. Visual perception of persons with PDD/DLB and visual hallucinations was significantly worse than in patients without hallucinations. Dementia with Lewy bodies (DLB) and Parkinson disease dementia (PDD) had similar associated profound visuoperceptual impairments whereas dementia of Alzheimer disease differed in their performance. The neuroimaging studies also report consist findings of hypoactivity in cortical areas involved for visual processing in DLB and PDD.

The perceptual organization skill in persons with AD, vascular dementia, front temporal dementia and mild cognitive impairment and age- matched neuro-typicals is investigated by Horvath, Szucs, Csukly, Sakovics, Stefanics and Kamondi (2018). Persons with AD differed significantly in their ability to detect contours as detection relied increasingly on long- range spatial interactions. In AD with atrophy and gliosis of white matter in the occipital lobe the impairments in contours detection were particularly pronounced. In persons with other dementias and participants with cognitive impairment this deficits in perceptual organization were not found. This specific deficit in visual perceptual organization is the characterization for the sub groups of AD which reflects the impaired functional integrity of occipital cortico-cortical pathways.

Language Processing and Communication in Dementia

1. Linguistic skills and their deficits in Dementia.

The language production and comprehension will interfere with the memory impairment in the form of retrieval, recognition and encoding to some extent and this will change in the course of illness. When tasks are shorter and commands are repeated, with slow rate of speech and providing contextual and written cues, linguistic memory is not affected in persons with mild dementia (Bayle & Kim, 2003).

For the purpose of pre clinical identification, this early cognitive linguistic skill can be used as a marker for diagnosis of Dementia. PWD exhibit significant impairment in gist and details (Chapman, Hesketh & Kistler, 2002). Lexical semantic processing, semantic paraphasias, word finding difficulty, fewer error repairs, fewer themes identifications are observed in persons with dementia (Forbes, Venner & Shanks, 2002). In picture description tasks persons with mild dementia produce meaningful and relevant description and figurative statements using accurate sentence structure and grammar (Hopper, Mahendra, Kim, Azuma, Bayles, Cleary & Tomoeda, 2005). But the complexity of the stimuli used to elicit discourse can influence the performance.

In general syntactic comprehension of German persons with dementia was assessed by Bickel, Pantel, Eysenbach and Schroder (2000). In this investigation sentence picture matching paradigm was used and it consisted of semantically reversible sentences. Sentences from simple active voice sentences to more complex sentences were used to check the syntactic complexity. In all these categories the Persons with dementia showed deficit. In the early stages of Alzheimer's disease the syntactic comprehension was only mildly affected. They suggest that the syntactic processing demands the intact working memory processes.

With reference to working memory processes it is important to know about word finding difficulties in persons with Dementia. Various studies have reported decline in their semantic abilities and a word- finding difficulties (Graham & Hodges, 1997). To assess persons with DAT numerous structured tasks were used, to mention few are the confrontation naming (Hodges, Salmon, & Butters, 1991), single word production (Martin & Fedoi, 1983), or generation of words beginning with a certain letter (Philips, Sala & Trivelli, 1996).

Use of wordless children's picture book is one of the paradigms used for story narration task according to Ash, Morre, Antani, McCawley, Work and Grossman (2006). The subjects considered were persons with nonaphasic persons with a disorder of social compartment and executive functioning (SOC/EXEC), semantic dementia (SemD), persons with progressive nonfluent aphasia (PNFA). Among these three groups of individuals there was significant discourse impairment and the differences was qualitatively important. To explain in brief, Persons with PNFA had produced narratives with only few words per minute and this was the sparsest output. There was difficulty in retrieval of words needed to tell their narratives in Persons with SemD. With reference to organizing the narratives, Aphasic, persons with SOC/EXEC had profound difficult and because of the same they could not effectively express the gist of the story. Impaired day to day communication in nonaphasic front temporal dementia persons with a disorder of social compartment and executive functioning is due in part to a striking deficit in discourse organization associated with right front temporal disease.

A person who is both elderly and has dementia may have impairments in understanding and processing speech that might be more easily overcome by a person with similar auditory comprehension, is gradually impacted by the cognitive deficits experienced by the persons. Social isolation behaviors may be the first signs if difficulties persist in this area. For concrete, simple, and structured language the auditory comprehension appears to be intact. Whereas abstract language was impaired, even in early stages, due to a lack of attention or concentration, encoding, or working memory deficits (Code & Lodge, 1987; Kempler, Van & Read, 1988). Welland, Lubinski, and Higginbotham (2002) found that persons with early and middle stage of dementia demonstrate poorer discourse comprehension of narrative than healthy elderly. But they exhibit better understanding of main ideas than details, and better comprehension for stated than implied information.

Language deficits are also noted at perception and production level and these are reserved at an average level till the late stage of AD. Imamura, Takatsuki, Fujimori, Hirono, Ikejiri, & Shimomura, (1998) assessed 150 persons with mild to moderate AD. Greater comprehension impairment was revealed from poor word comprehension and poor ability in following sequential commands in the early onset AD persons (Binetti, Magni, Padovani, Cappa, Bianchetti, & Trabucchi, 1993; Imamura, Takatsuki et al. 1998).

2. Cognitive decline, communication and dementia.

Feyereisen, Berrewaerts and Hupet (2007) aimed to study to what extent persons suffering from DAT can benefit from shared experience through trial repetition to achieve common reference. The participants considered for this study was DAT with a score of 18-27 on the administration of MMSE and classified as minimal or mild stage dementia. The other group was the neuro-typical individuals in the age range of 64-86 years and the total participants in each group were 13 in number. The assessment tasks included were executive functions and referential communication paradigm. The participants of control group produced less number of words compared to persons with DAT and this DAT group benefited from task repetition but still was not able to take the previously shared information. They used more idiosyncratic referents in their descriptions and definite referential expressions were not used. This poor communicative effectiveness was not related to the executive deficits. Along with this deficit, the persons with DAT showed poor memory in preceding episodes or other cognitive impairments.

Hence it is understood that communication is a manifestation of cognition. The simple act of object naming requires perception, access to long term memory, association, recognition, lexical retrieval, decision making, motor planning, and self-monitoring (Deepa & Shyamala, 2010). Then, the complete act of discourse needs association between short term and long term memory. When healthy elderly face deficits of cognitive-linguistic skills, then this will be exaggerated in adults with neurogenic communication disorders which encompass a variety of specific abnormalities all caused by nervous system pathology. Their features, severity and outcome reflect the location, magnitude and nature of the abnormality.

And these deficits emerge as dynamic and range from subtle to severe. Present study is primarily based on persons with mild dementia.

This presence of memory impairment in the form of recognition, encoding and retrieval there will be interference with the language comprehension and production at the discourse level. This will be varied over the course of illness in Dementia. Discourse produced by older adults is rated as highly as that of young adults for story quality, interest, clarity, and informativeness (Kemper, Kynett, Rash, O'Brien & Sportt, 18989. Kemper, Rash, Kynette, & Norman, 1990; MacKay & James, 2004). When asked to interpret stories, older adults are more likely to generate elaborated, integrative, symbolically rich responses than young adults. But older adults may recall less of the literal propositional content when asked to do so (Adams, Smith, Nyquist, & Permuter, 1997). This pattern of reduced grammatical complexity, increased structural complexity, and greater elaboration does not, however mean that all aspects of discourse become easy to read or listen in old age. Decreased cohesiveness and greater likelihood of ambiguous reference have also been reported. Hence there is a need to study discourse and analysis the same over the course of illness in Dementia.

3. Discourse Analysis

Discourse can be elicited through many ways. As in this present study, the discourse genres used are conversation, narration and picture description. First, in assessing communication outcome, the emphasis has moved from impairment to its consequent effects on functional activity and participation in society. Alongside, this has come to an increasing focus on conversation since it is a socially vital tool but its evaluation by speech and language therapists is not yet a routine. Detailed conversation analysis is time consuming and not easily quantified. But measuring communicative informativeness under discourse condition is perhaps the most valid means of determining the interpersonal verbal communication abilities of any individuals with or without dementia. Coordination between the speaker and listener is necessary in any conversation, but it can be shared among the speakers and they share the communicative responsibility. However, the data derived from such analyses are expensive to collect and subject to unknown sources of variability. It is known that subjects produce significantly greater percentages of informative words assessed in terms of correct information units (Nicholas & Brookshire, 1993) under conversational discourse conditions rather than structured conditions.

Narration involves expressing a complex series of events in an organized way. This process is fundamental for human communication, yet we know little about its linguistic basis. This process involves two major components, the linguistic component and the executive resource component (Mar, 2004). During any narrative production, the linguistic functions are concerned with grammatical processing, which serve to express the content of an event, lexica, phonology and morphology. The second component is cognition, which involves higher level of cognitive processing that plays a fundamental role in organizing a narrative, such as sustaining a theme through working memory, and maintaining event

coherence through top-down planning and organization. The successful interaction between these two linguistic and cognitive processes results in the production of a sequence of utterances that relate to each other in expressing a logical and coherent narrative.

Apart from conversation and narration task, the most interesting and simplest task to elicit discourse during diagnostic assessment is the picture description task. There are instances to prove that this is the best task, to mention few are the predictable content that yields relatively brief language samples within short duration and it requires little time to transcribe, assess and infer the abstract information and efficiency of coherence among concrete items in the stimuli. The extraneous variables like world's knowledge and individuals' intelligence are the only factors which get highly influenced for the day to day communicative interactions. The influence of these extraneous factors may be ruled out using standard picture stimulus and among the clinical populations make differential diagnosis and establish the normative data in discourse. Therefore, this task of discourse elicitation depends on the type discourse analysis. In this present study, quantitative analysis of discourse was applied.

In general a tool used to assess speech and language at the level of research and advanced clinical procedure like articulatory assessment and syntactic assessment is called Discourse Analysis (DA). DA deals with the assessment of discourse attempts used to trace the patterns in communicative products and their correlation with the circumstances in which it occur, which cannot be explained at grammatical level (Carter, 1993). This is the branch of applied linguistics. Discourse can be a conversation or a monologue and these are further classified as narrative, expository, procedural and conversational. Narrative discourse can be description of events. Conveying information on a single topic by a single speaker is called expository discourse. Describing the procedures involved in performing the activity is called Procedural discourse. Finally, conveying information between listener and speaker or among speakers and listeners to exchange ideas, thoughts and feelings. The use of this analysis remains largely limited to research and within academic settings, because of its time-consuming nature of transcription on which DA is currently based. The time required to transcribe and analyze lengthy discourse samples puts discourse analysis out of reach for most practicing clinicians (Boles & Bomard, 1998). Because of its apparent time consuming nature and overwhelming number of assessment options available it is often not the assessment of choice (Togher, 2001).

Here DA mainly includes conversational discourse, since it is a prevailing mode of human communication. On comparison with different discourse genres it is argued, that conversation has greater validity to real –life situations than monologues. Therefore, assessment of discourse among any individuals should focus primarily on conversational discourse. However, monologic discourse also has clinical validity in terms of easy and quick evaluation. Hence discourse analysis based on conversation and monologue plays an important role both in theoretical and clinical awareness. Thus, present study is based on the discourse analysis of different type of speech samples of an individual with traumatic brain injury (TBI).

There are various approaches to discourse analysis. They include discursive psychology, socio-cognitive discourse analysis, political discourse analysis, conversational analysis and critical discourse analysis. Critical discourse analysis (CDA) is an interdisciplinary approach to study discourse that views language as a form of social practice and focuses on the ways social and political domination are visible in text and talk (Wodak, 2009). Political discourse analysis deals with the discursive conditions and consequences of social and political inequality that result from such domination (Fairclough 1995; Van Dijk 1993b). The social psychology of discourse is a new field of study that partly overlaps with the social psychology of language (Van Dijk, 1990).

These are several approaches of analyzing discourse, the major process of analyzing discourse can be qualitative and the other can be quantitative method of analysis. The qualitative method include propositional and non-propositional analysis, the foremost is the within – sentence analyses which includes measures of discourse structure, communication intent, informational adequacy in terms of sentential complexity, informational content and accuracy, coherences includes global and local coherence, topic management and verbal output errors includes dysfluencies, speech style, and intonation. The non-propositional analysis is the across-sentence analyses comprising of turn taking, revision behaviors and use of conversation repair. The study consists of three types of discourse genres, a conversation, narration and picture description. The conversation, narration and picture description tasks are analyzed using ‘Discourse Analysis Scale’ (Hema & Shyamala, 2008), for qualitative analysis. In the present study conversation, narration and picture description were the tasks given to the participants.

4. Discourse in persons with Dementia

The communicative impairment present in persons with dementia has become the area of research because of the growing interest by the speech language pathologists and neuropsychologists. It is known that the pragmatic knowledge and the semantic aspects are markedly impaired in persons with mild to moderate dementia when compared to the lexical knowledge, syntactic aspects and phonological aspects (Appell, Kertesz & Fisman, 1982; Bayles & Kim, 2003; Emery, 1993; Murdoch, Chenry, Wilks & Boyle, 1987). A few studies in general which measures discourse are as follows.

Persons with DAT produce language of reduced syntactic complexity on studies involving language assessment procedure for oral and written discourse task. These participants show the ability to use more simple constructions correctly (Kempler, LaBarge, Ferraro, Cheung, & Storandt, 1993; Lyonds, Kempler, LaBarge, Ferraro, Storandt, & Balota, 1994). Compare to phonological and semantic errors they show the ability to correct their syntactic errors more frequently (Cushman & Caine, 1987). From this observation, it can be concluded that the correct sentences were produced by DAT and if defective sentences are identified correctly, the observed difficulties in sentence reception could be due to the deficit in performance rather than to lack of competence (Bickel, Pantel, Eysenbach, & Schroder, 2000).

Persons with DAT are characterized with the degraded semantic networks according to Ralph et al (2001) and on administration of standardized test; they also show evidences of reduced confrontation naming ability and poor semantic verbal fluency (Zakzanis, Leach & Kaplan, 1999). This language decline is accompanied due to the decline in the other cognitive domains, as opposed to the circumscribed language breakdown seen in aphasia. Therefore in persons with DAT, there is a platform created to explore the discourse production in the context of broader pattern of cognitive impairments. Change in working memory may result in the poor performances on discourse task (Almor, Kempler, MacDonald, Anderson, & Tyler, 1999).

4.1 Discourse parameters affected in persons with Dementia

It is also reported that the narrative themes, information units and nouns were few in number with reference to the *language content* when compared to age matched healthy elderly (Bayles, Boone, Tomoeda, Slauson & Kasniak, 1989; Almor, Kempler, MacDonald, Anderson, & Tyler, 1999). This change in discourse performance is predominantly pragmatic in nature according to the research till date. The features observed are difficulties in expressing communicative intentions, maintaining languages and information balance and drawing inferences (Ripich, Vertes, Whitehouse, Fulton, & Ekelman, 1991; Garcia & Joannette, 1994; Watson, Caroline, Chenery, & Carter, 1999).

With reference to the pragmatic aspects, there are several requirements for organized conversational interactions. The requirements are like each participant will have a chance to talk, only a single person can talk at a time, there should be a brief gap between the turns, the order of the speakers and the quantity of each speaker speaks is not fixed in advance and who speaks when is decided by a technique (Clark, 2002).

Turn constructional conversations determine turn content. *Conversational turn taking* is reportedly maintained at the early and middle stages of dementia (Golper & Binder, 1981). The conversational abilities in persons with dementia are described based on the deviance with respect to the conversation skills of healthy elderly. Conversations of six persons with dementia of Alzheimer's type along with the experimenter were investigated by Ripich and Terrell (1988). On an observation it is reported that, the authors found that persons with dementia required regular prompts from the interviewer and had also produced short conversational turns.

Ripich, Vettes, Whitehouse, Fulton and Ekelman (1991) has examined the conversational turn taking and speech act patterns in the discourse of 11 persons with SDAT (senile dementia of Alzhiemer's type) and 11 healthy elderly. As a result, words per turn differed with the examiner using shorter turns with SDAT. This pattern of compensatory shifts in discourse suggested retained flexibility in the communication system of early stage of SDAT.

The discourse production of persons with Alzheimer's type also assesses *topic management*. Mentis, Whittaker and Gramigna (1995) examined the topic management in the discourse of 12 persons with dementia of Alzheimer's type (DAT) and healthy elderly. They found that the persons with dementia of Alzheimer's type had a reduced ability to effectively

introduce new topics and had difficulty in sustaining and contributing to topics. A similar result was found by Gracia and Joannette (1994) on a spontaneous speech task, where the participants with DAT had unexpected topic shifts due to the failure to continue and repeat the ideas.

Persons with Dementia of Alzheimer's Diseases also showed deficits in *informative content, story schema and cohesion*. The task was a narrative discourse production from a computer generated animations. DAT included were seven in number and were compared with neuro-typical individuals on a variety of linguistic measures. The discourse deficits were consistent, sensitive and time efficient since the task was a computer generated animation Chenery and Murdoch (1994).

Linguistic processing ability of three groups of elderly population for example healthy elderly, persons with Alzheimer's Disease (AD) and fluent aphasia (APH) were considered to study the processing ability of proverb (Chapman, Ulatoska, Franklin, Shobe, Thompson, and McIntire (1997). Task was spontaneous presentation and multiple choices. The sensitivity of linguistic and cognitive measures as predictors of ability to interpret proverbs was also investigated. In relation to healthy elderly, persons with fluent APH exhibited minimal difficulty. Conversely, the persons with AD manifested significant problems selecting the correct abstract response for familiar proverbs. Cognition was a sensitive predictor for unfamiliar proverb interpretations and to the potential breakdown of underlying linguistic and cognitive processes.

Speech fluency was assessed in 35 persons with frontotemporal lobar degeneration (FTLD) who presented with progressive non fluent aphasia (PNFA), semantic dementia (SemD), or a social and executive disorder without aphasia (SOC/EXEC) (Ash et. al., 2009). Fluency was quantified as the number of words per minute in an extended, semi-structured speech sample. When compared to healthy elderly, PNFA people other persons with FTLD were significantly less fluent. Fluency correlated with grammatical expression but not with speech errors or executive difficulty. Persons with SemD and SOC/EXEC were also less fluent than controls. In SemD, fluency was associated with semantically limited content. In SOC/EXEC, fluency was associated with executive limitations.

Discourse is also analyzed in terms of linguistic formulation and three pragmatic aspects including *interpreting communicative intentions, inference, and ratio of language to information*. Chapman, Highley and Thompson (1998) compared discourse performance across three groups, i.e., healthy elderly, mild to early moderate stage Alzheimer's disease (AD) and persons with mild to high- moderate aphasia (APH). Proverbs, single-frame pictures and fables were used to elicit text of varying linguistic and pragmatic difficulty. On linguistic formulation, the APH group received significantly lower scores than both the AD and healthy elderly groups. With reference to pragmatic domain, drawing inferences was relatively better for APH and good for NC group where as the persons with AD exhibited significant difficulty. Therefore there is qualitative difference in the linguistic formulation and ability to draw inferences between AD and APH groups suggested disparity in their discourse.

The other discourse variables like incomplete propositions and repeated propositions are also studied Brandoa, Catello, Dijk, Parente and Pena-Casanova (2009). This is to examine the linguistic and cognitive mechanism involved in knowledge management (*information adequacy*) during discourse production task of Alzheimer's disease (AD). The discourses of AD patients were with incomplete propositions on a non-informative prompted task. The findings of informative prompted task suggested good knowledge management in early stage of AD than the later stage AD participants. The presence of incomplete propositions correlated with the neuropsychological data.

Orange, Lubinski, and Higginbotham (1996) investigated conversational breakdown in persons with dementia of Alzheimer's type. The results of this study indicated that there is greater *need for repair* as dementia severity increases. Specifically, the type of trouble sources noted in the turns of persons with dementia suggests that they were less efficiently able to follow themes and propositions. *Repair initiators* used by them were primarily nonspecific requests for clarification or minimal queries.

Watson, Chenry and Carter (1999) investigated the *frequency and nature of trouble and repair in conversations* between persons with dementia of Alzheimer's type and their conversation partners. In this study normal participants used a wide variety of repair trajectories and other- initiated repair. These were high proportions of self –initiated repair used by the persons with dementia. But they used self- initiated self-repair of 81% effectiveness indicating the inefficiency to monitor and correct errors occurring during their current turn.

With reference to the discourse parameter "*Cohesion*" attempt has been made to quantitatively describe aspects of discourse of nine persons with DAT and age matched normal adults through several elicited narrative discourses such as expository or subject oriented discourse (picture story descriptions, telling a memorable story) and procedural discourse (describing how any activity is done) (Shekim & La Pointe, 1984). The DAT adults were found to have fewer *cohesive ties per content unit*, more exophora or references to information outside the text, more performance deviations, slower speech rate and more maze (jumbled or confused) words. This study however, focused more on qualitative aspects rather than quantification of the discourse.

Therefore, the qualitative and the quantitative use of cohesive ties were studied by Lock and Armstrong (1997). The task was the expository discourse and the groups considered were normal young and older adults, older people with anomic aphasia and older people with probable Alzheimer's disease (AD). Among the groups there was difference in discourse cohesion quantitatively and qualitatively with the clinical implication of how language use changes through senescence and pathological conditions. Significant differences in the quantitative and patterns of use of cohesive ties in the discourse of people with anomic aphasia and people with AD revealed that cohesion analysis can differentiate the language disorders found in these two groups.

"Coherence" and "informativeness of discourse" was examined in persons with probable Alzheimer's disease (AD), persons with vascular dementia (VaD), age and

education matched normal elderly (Laine, Laakso, Vuorinen & Rinne, 1998). The clinical group considered were mild to moderate dementia, thus had a comparable levels of cognitive impairment. They showed impaired global thematic coherence and reduced informativeness in their discourse. The presence of local coherence between two successive utterances did not reliably differentiate the clinical group from normal elderly. The conceptual semantic impairment in these clinical groups was addressed from poor global coherence in their discourse genre. The most often seen discourse impairment was the empty phrases and disruptive topic shifts. The clinical groups were facilitated with the conversational strategies as reported by the conversational partners where they had to deviate from the conversational protocol. This poor performance on discourse task indicated or reflects the decline in their memory.

Finally the last parameter of discourse called the “Linguistic non fluency” which is studied by Kasper (2008) aimed to evaluate whether a discourse analysis can be used to assess the progress in senility and dementia. They noted the frequency of use of redundant terms in the form of fillers and inappropriate demonstratives, unnecessary pauses in the conversations and their relationship between these variables were also analyzed. The frequency of senility element called the unnecessary pauses was correlated with age and to some extent with the level of dementia. As a clinical implication, the progress of senility and dementia can be assessed or commented based on the performance of discourse analysis.

5. Indian Studies on Dementia

Mahendra and Karanth (1996) designed a language test in Hindi to differentially diagnose Dementia from Aphasia. This tool consisted of real object naming, picture naming, generative naming, word association test, picture card sequencing and delayed story recall, and descriptive discourse. The results indicated that the test designed on the whole was very sensitive in detecting the language performance differences between healthy elderly and persons with Alzheimer’s dementia. Real object naming, word association and discourse related tasks differentiated persons with dementia from Aphasia.

Thomas and Goswami (2016) have studied verbal perseveratory and anticipatory errors in persons with Alzheimer’s disease as compared with healthy elderly. The study included three categories of clinical participants (mild, moderate and severe Alzheimer’s disease). They included four tasks, general conversation, confrontation naming, generative naming and picture descriptions. Persons with AD obtained higher percentage of perseveratory as compared to healthy participants. Generative task and general conversations were found to be potential tasks to elicit perseverations in both the groups. Picture naming task obtained lower scores as compared to object naming. There was an obvious and statistical difference in frequency percentage of perseveratory errors in persons with Alzheimer’s disease.

Sunil, Carmel and Shyamala (2008) studied and profiled the language and cognition deficits associated with Multi Infarct Dementia (MID). The material used to assess the language and cognitive deficits were some of the standardized tests like Western Aphasia

Battery in Kannada, Revised Token Test, Linguistic Profile Test in Kannada, Cognitive Linguistic Assessment Protocol in Kannada. The participants showed poor performance on certain tasks of the standardized tests and it is summarized that they had deficits like deficits in executing verbal commands like confusion of colors, sizes and objects, reduced mental abilities and syntactic deficits and word finding difficulty.

Deepa, Sudheer and Alladi (2008) described the ability of persons with five types of dementia with mild cognitive impairment. Set of assessment tools were used to assess their cognitive ability and language was only screened. The tests were Rey Complex figure test, Rey Auditory verbal learning test and Addenbrooke's cognitive examination revised. Along with these test the discourse data was collected for narration tasks and picture description task. In persons with dementia, with reference to the cognitive impairment, they performed poor on memory related task, attention and orientation task. Visuospatial skills were also reported to be poor along with poor language fluency. However, at discourse level they had increased verbal output but their discourse lacked in essential information, showed poor coherence and tangential preservative language. On the other hand, MCI participants exhibited naming deficits as they showed deficits in object naming or identity. The detailed description of their speech out is as follows: they convey empty or non-meaningful and little information, this reflect poor usage of precise terms and excessive usage of broad general terms.

A test battery was developed by Sunil and Shyamala (2009) to assess persons with dementia. There were four domains to assess the cognitive linguistic aspects in persons with dementia. They were linguistic expression, linguistic comprehension, visuospatial construction skills and memory. The battery was administered on 30 healthy elderly and 10 persons with dementia. In most of the subtests like following commands, reading comprehension and spontaneous speech etc the performance of persons with moderate dementia was near normal. In the tasks related to generative naming and drawing, picture naming, episodic memory and working memory the persons with moderate dementia exhibited difficulty. There was poor score on spontaneous speech output thus failed to attempt to any of the tasks in case of persons with severed dementia.

Alladi, Mekala, Chadalawada, Jala, Mridula & Kaul (2011) investigated verbal fluencies in persons with AD in their first and second languages. Their performance was compared with that of age, gender, education and language proficiency matched neurologically normal adults. There was a decline in the fluencies in persons with AD when compared to neurologically normal adults. However, there were no differences observed in both the groups between phonemic and semantic fluencies. There was a strong effect of language on category. No differences were found between L1 and L2 for the phonemic fluency task and all the living things categories. A higher number of words were generated in L2 (English) for all categories of non- living things. The authors have suggested testing the category of wild and domestic animals in order to test fluencies in bilingual Telugu or Hindi and English speaking participants.

Chitnis, Bhan, Alladi, Rupela and Ray (2010) investigated verb naming in individuals with semantic dementia in comparison with neurologically normal participants. Persons with

semantic dementia named fewer verbs correctly when compared to normal participants. The study showed that persons with semantic dementia do not show any differences in performance between transitive verbs. Repetition and semantic cues were not very effective in eliciting names of verbs in Telugu and English among the participants with semantic dementia. They have difficulty in verb naming in L2 (English) than in L1 (Telugu). Lexical semantic errors were seen in both Telugu and English among persons with Semantic dementia.

Anusha and Shivashankar (2010) aimed at profiling auditory comprehension deficits in a total of 103 persons with dementia (vascular, mixed dementia, fronto temporal dementia and Alzheimer's disease). Auditory comprehension abilities were evaluated using Linguistic Profile test and Revised Token Test. The qualitative analysis did not reveal any significant differences in the performance between the different types of dementias.

Thus, there are various studies on discourse parameters and the variable of cognitive linguistic aspects assessed in population with dementia. Complex discourse production was used to study the difference between normal adults and dementia using the measures of richness of vocabulary by Deepa and Shyamala (2010). Conversational speech and Spontaneous speech were analyzed using three linguistic measures of richness of vocabulary. The findings suggested that subtle differences were noticed in the abilities of persons with mild dementia in relation to the differences in the length and quality of individuals' complex discourse production in comparison with the individuals with normal cognition.

On reviewing the various studies related to dementia, most of them have focused on quantitative aspects of discourse irrespective of monolingual dementia individuals or bilingual persons with dementia and various severity of dementia. From the present literature, it is observed that these studies inferred that there is qualitative and quantitative reduction in the speech of persons with dementia when compared to neurotypical individuals. Qualitative analysis of discourse is minimal. Also there is dearth of literature with respect to studies done in Indian population assessing the discourse genres using qualitative analysis. Hence this necessitates the need to investigate the discourse in adults with Dementia. With this the study aimed to validate Discourse Analysis Scale (DAS) in adults with Dementia.

CHAPTER III

METHOD

3.1 Aim

The present study aims to validate the Discourse Analysis Scale (DAS) in Adults with Dementia.

3.2 Objectives

The main objectives of the present study are

1. To validate the Discourse Analysis Scale (DAS) on individuals with Dementia exhibiting cognitive communicative deficits.
2. To evaluate the effectiveness of DAS in assessment of discourse of individuals with Dementia exhibiting cognitive communicative disorders.
3. To evaluate the effectiveness of DAS by discussing the co-relation between discourse abilities and the underlying cognitive functions.

3.3 Participants

The participants included for the study were 40 individuals with dementia in the age range of 40 and above years. All individuals were native speakers of Kannada language and both males and females participated in the study.

3.3.1. Location of the participants

All the participants were recruited primarily from the residential place in and around Mysore through referrals from Hospitals like Apollo, JSS, Narayana Hrudayala and few private clinics of neurologist and psychiatrist doctors from Mysore, few from old age homes in Mysore, and few from the All India Institute of Speech and Hearing Karnataka, India.

3.3.2. Criteria for selection of participants

- ✓ Participants with a diagnosis of Dementia confirmed by a neurologist were considered for the study. This clinical group with Dementia had undergone medical screening. The screening included either Computerized Tomography (CT) or Magnetic Resonance Imaging of the head. The presence of significant medial temporal lobe atrophy for Alzheimer type of Dementia, frontal lobe degeneration for Pick's Diseases, evident cerebral haemorrhage (bleeding in the brain) with reference to vascular dementia were looked in for confirmation of Neurological signs of Dementia among the participants.

- ✓ All individuals were above 40 years and total of 40 participants with Dementia leading to cognitive-communicative disorder were considered for the present study.
- ✓ These participants had completed a minimum of 10 years of formal education.
- ✓ Participants were initially screened for cognitive skills using Montreal Cognitive Assessment (MOCA version 7.0) and further confirmed on **Dementia** on administration of Clinical Dementia Rating scale (Morris, 1993) and categorize into mild/moderate. Where they should have had complaints of memory or any other cognitive difficulties which would affect their communicative abilities. Thus, they have to obtain a score of < 21 on Montreal Cognitive Assessment (MOCA version 7.0; Z. Nasreddine, 2005) to confirm cognitive impairment. Only individuals with mild to moderate dementia were included in the study, since severe cognitive impaired individuals have limited or no discourse production.
- ✓ All the participants were native speakers of Kannada language. Both monolingual and bilingual speakers were recruited, the proficient language or L1 had to be Kannada (Mother tongue). L2 and/or L3 could be English (most frequently used/or medium of instruction at school/college) and/or Hindi and/or Tamil.
- ✓ As per the rating on re-adapted version of National Institute of Mental Health (NIMH) Socioeconomic Status Scale, (Venkatesan, 2011) (Appendix-A), all the participants were ensured belong to a middle/high socioeconomic status.
- ✓ All the participants were screened for any other neurological or psychological illness other than signs for dementia and the General Health Questionnaire (Golderberg & Williams, 1988) was also administered.

3.4. Assessment Protocol

3.4.1. Informed consent

Informed consent proposed by AIISH (All India Institute of Speech and Hearing) Ethical committee (2009) was used to obtain consent from each of the participant (Appendix-B). The informed consent form consisted of two parts: the verbal information sheet and the consent form.

Verbal information sheet: The information sheet included information on the title and objective of the study being undertaken along with the type and number of participants. They were highlighted about risk/benefits for human research subjects willing to participate in the study. Assurance was provided to the participants that they would be clarified of any doubts at any time during the data collection/study. Emphasize was made on the privacy-confidentiality-anonymity of participating human subjects. Information sheet also consisted of a clear appreciation and understanding about introduction to the study, procedures and protocol, duration, confidentiality, sharing the results, right to refuse or withdraw, and whom to contact.

The consent form: The certificate of consent consisted of written statement in first person, in bold. The consent form was signed by the entire participant or the caregiver in some cases in the study.

3.4.2 General information Sheet

The general information included patient's demographic details (Name, Age, Gender, and address, contact), native language spoken, other languages known, education, occupation, present illness, hearing and vision status. This was succeeded by detailed medical history that included details on present symptoms of Dementia, details of both medical and non- medical treatments, earlier investigations done and information on tests done (MRI or CT reports) and impression made by their respective Neurologist or Psychologist consultants. The General Health Questionnaire (GHQ) was also administrated for all the participants (Appendix C).

3.4.3 Montreal Cognitive Assessment

The Montreal Cognitive Assessment (MoCA version 7.0; Z. Nasreddine, 2005). The Montreal Cognitive Assessment (MoCA Version 7.1) (Appendix D) was developed as a quick screening tool for MCI and early Alzheimer's dementia. The domains of cognition like, attention and concentration, memory, executive functions, language, conceptual thinking, visuoconstructional skills, calculations, and orientation were assessed. This test is widely used to assess these aspects on a variety of disorders affecting cognition such as, Dementia, Multiple Sclerosis, Parkinson's disease, stroke, vascular dementia, Huntington's chorea and substance abuse. It has been tested in 14 different languages, ages ranging from 49 in to 85+ across various education levels. The total possible score is 30 points with a score of 26 or above is considered normal. To better adjust the MoCA for lower educated individuals, 2 points is added to the total MoCA score for those with 4-9 years of education and 1 point for 10-12 years of education (Doerflinger, 2012). The score range for MCI is 19-25.2 and for dementia is 11.4 -21. IN the present study all the participants had a score within this range of 11.4 to 21. The MoCA detected MCI with 90%-96% range sensitivity and specificity of 87% with 95% confidence interval. The MoCA detected 100% of Alzheimer's dementia with a specificity of 87% (Wittich et al, 2010).

3.4.4 Clinical Dementia Rating Scale (CDR)

The Clinical Dementia Rating Scale (CDR) was developed for the evaluation of staging severity of dementia for the assessment of different stages of dementia. It introduced as part of Memory and Aging Project at Washington University School of Medicine in 1979. Primarily developed for use in persons with dementia of the Alzheimer type and it was proposed that it can be used to stage dementia in other illnesses as well. The rating scale is a five-point scale in which CDR-0 refers to no cognitive impairment, and rest is for various stages of dementia:

- ✓ CDR-0.5 = very mild dementia
- ✓ CDR-1 = mild
- ✓ CDR-2 = moderate

✓ CDR-3 = severe

In assigning a Global CDR, the six domains are scored individually to conclude on the overall CDR table. These domains are namely; Memory, Orientation, Judgment and Problem solving, Community Affairs, Home and Hobbies, and Personal Care. Each of these domains is assessed based on the patient's cognitive ability to function in these areas. The participants considered for the present study had a Clinical Dementia Rating as Mild Impairment in all the domains of CDR Scale.

3.5. Assessment Procedure

3.5.1 Data collection

All the participants diagnosed with Dementia were subjected to complex discourse production tasks. This involved three types of discourse elicitation from the participants in Kannada language, namely; conversation, narration and picture description genre.

1. *Obtaining discourse sample of conversation using a topic ('My country- India') or ('My family').*

For the conversation task, topic selected was "My country- India". Instructions provided to the participants were as follows.

Instruction: "What do you say about our country "India"? Please tell me in terms of culture, politics, education, and famous places in this country. I want you to tell me everything about these topics in general until I ask you to stop after few minutes."

Instruction: "Can you tell me about your family"? Please tell me about who all live with you, their work, names and your favourite pass time with them. I want you to tell me everything about your family in gist until I ask you to stop after few minutes."

2. *Obtaining discourse sample of narration using a topic ('Journey to a place').*

Participants were given a topic "Journey to a place" to narrate in detail.

Instruction: "Imagine your past/future journey to a place and narrate the preparations done before the journey and how did you spend your time during the journey."

3. *Obtaining discourse sample of picture description using a line drawing picture of 'a picnic spot' from Western Aphasia Battery (Shyamala & Ravikumar, 2008).*

For the picture description task, line drawing picture 'a picnic spot' (WAB by Shyamala & Ravikumar, 2008) was used. (The picture was 6 x 4 inches in dimension). All the participants were instructed to tell the gist of information and then describe the events happening in the picture. They were asked to name all the contents in the picture and describe the same.

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. The recordings for all the three tasks were done in two phases: Phase- I and Phase-II. In Phase-I, 4 to 5 minutes' interaction was recorded which aimed to improve interaction and build rapport between the investigator and the participants. In Phase- II, to obtain discourse samples of all

the participants the recordings were done in one or two sessions according to the convenience of the participants. Here the participants showed less inhibition in their discourse, since they became quite accustomed to the investigator, only fifteen to twenty minutes speech samples of these sessions were selected for the final analysis. Before recording, the participants were instructed to talk in a casual way. In the first session recording, the participants had to use only L1 (for example- Kannada language) for conversation, narration and picture description tasks. Subsequently after few days, same participants had to complete the remaining tasks which were pending from the first session. This was mainly done for the participants above 60 years of age. Attempt was made to complete the entire task in one session itself for the participants below 60 years of age. All the recordings were carried out in a quiet room with no distraction during or in between the recordings at All India Institute of Speech and Hearing, Mysore or residential places of the participants. The participants were aware that their speech was being recorded and were also informed that they were free to ask any questions related to the topic to the examiner during the conversation. Handy cam (Sony digital recorder H302233) was used to video record each session. Three tasks would last for a duration of 15-20 minutes allowing as much time as required to collect at least 400-500 words (arbitrarily determined for the study) of conversation, narration and picture description from each participant using the specific instructions as mentioned above to complete the data collection process.

3.5.1 Data analysis

The discourse samples were analyzed qualitatively for conversation, narration and picture description tasks. Qualitative rating of discourse was carried out using Discourse Analysis Scale (Hema & Shyamala, 2008) developed as a part of thesis titled 'Discourse Analysis in Kannada- English individuals with Traumatic Brain Injury'. (Appendix E, F, G)

Discourse Analysis Scale analyses the discourse samples qualitatively using a perceptual rating scale. It consists of a set of parameters and a list of skills under each parameter. Each skill will be rated separately and a final index is obtained for them. The scale has separate ratings for conversation, narration and picture description. It measures the propositional and non-propositional aspects of conversation, narration and picture description. The propositional aspects of discourse includes discourse structure, communication intent, coherence, information adequacy, information content, message accuracy, temporal and causal relationship, topic management, vocabulary specificity, linguistic fluency, speech styles, intonation, gaze efficiency and response time. The non-propositional (interactional) aspect of communication includes turn taking, revision behaviours and conversational repair/repair strategy. These parameters have been described and statements were framed to rate them. The (three point perceptual) rating scale consisted of uniform rating of 0, 1 and 2 where '0' represented the behaviours that were poor, '1' represented behaviours that were fair (at least 50% of the time there is positive response) and '2' when the behaviours were good. The rating scale was used for scoring. Thus, total scores of the Discourse Analysis Scale (DAS) for conversation, narration and picture description could be obtained. These total scores of DAS for these tasks have been further divided into two sub levels, the propositional and non-propositional total.

After the completion of the rating, the scores were entered and tabulated. The statistical analysis of the data was carried out using *Statistical Package for Social Sciences (SPSS) software (version 19.0)* as described in the following results section.

CHAPTER IV

RESULTS

The aim of the present study was to validate the Discourse Analysis Scale (DAS) in Adults with Dementia. The discourse samples in the form of conversation, narration and picture description of 40 males and 40 females with dementia in the age range of 40 and above were considered for analysis. Qualitative procedure of analysis was applied to analyze the discourse samples using separate Discourse Analysis Scale for conversation, narration and picture description genre. This (three point perceptual) rating scale consisted of uniform rating of 0, 1 and 2 where '0' represented the behaviors that were poor, '1' represented behaviors that were fair (at least 50% of the time there is positive response) and '2' when the behaviors were good. The rating scale was used for scoring. Thus, total scores of the Discourse Analysis Scale (DAS) for conversation, narration and picture description could be obtained. These total scores of DAS for these tasks have been further divided into two sub levels, the propositional and non-propositional total. Also few aspects within Propositional and Non propositional were totaled for comparison.

All the totals of each section were computed in terms of percentage and subjected to statistical analysis of the data using *Statistical Package for Social Sciences (SPSS) software (version 19.0)*. Initially the data was subjected to test of normality. On administration of Kolmogorov–Smirnov and Shapiro–Wilk tests, the results revealed only the total discourse scores of conversation, narration and picture description tasks were normally distributed ($p>0.05$), and hence, parametric tests were applied for the overall discourse scores of conversation, narration and picture description under statistical analysis. The data of all the other subsections of conversation, narration and picture description (coherence & discourse, communication intent, topic management, other parameters of speech, turn taking abilities & revision and repair skills) tasks were not normally distributed ($p<0.05$) and hence, non-parametric tests were applied on these sub- parameters of propositional and non-propositional aspects of all three discourse genres.

The results are discussed in four sections based on tasks of complex discourse production in the following headings:

- i. Qualitative analysis of parameters within conversation production task (propositional versus non propositional) in adults with Dementia using DAS.
- ii. Qualitative analysis of parameters within narration production task (propositional versus non propositional) in adults with Dementia using DAS.
- iii. Qualitative analysis of parameters within picture description (propositional versus non propositional) in adults with Dementia using DAS.
- iv. Comparison of overall discourse score across conversation, narration and picture description performances in adults with dementia.

4.1. Qualitative analysis of parameters within Conversation discourse genre.

The propositional and non- propositional aspects of conversation sample of each participant was analyzed using standard discourse analysis scale. Within propositional aspect parameters analyzed were discourse structure, coherence, communication intent, topic management, other parameters of speech and under non propositional aspect turn taking skills, revision and repair skills were analyzed. Descriptive statistics was applied in terms of mean, median, standard deviation on these parameters and results are shown in the Table 4.1.1 below.

Table 4.1.1: *Mean, Median and Standard deviation of Conversation Proposition and Non propositional aspects*

Discourse parameters	Mean	Median	S.D
Conversation Propositional scores	33.48	33.93	4.31
Conversation Non proposition scores	22.08	22.50	5.65
Conversation Propositional parameters			
Conversational discourse structure & coherence	39.93	37.50	8.35
Conversational communication intent	31.34	28.57	7.30
Conversational topic management	34.72	37.50	8.10
Other speech parameters	35.18	33.33	7.99
Conversation Non- Propositional parameters			
Conversational Turn Taking abilities	28.05	30.00	8.21
Conversational Revision behaviors	16.67	20.00	5.85

On observing the mean and median of propositional and non-propositional aspects of conversation, it was noted that propositional aspects of conversation was better in individuals with dementia compared to non-propositional aspects. Hence, individuals with dementia had better propositional skills when compared to non-propositional aspects.

Further, to note significant difference among these parameters, non-parametric tests were applied (since the data was not normally distributed). Friedman Test revealed there is significant difference ($\chi^2=52.22$, $df =2$, $p=0.00$) within the parameters of propositional and non-propositional aspects of conversation. Further, pair wise comparison was done and results are as shown in the Table 4.1.2 below.

Table 4.1.2: Results of Wilcoxon’s Signed Rank Test for Propositional and non-propositional aspects of Conversation.

Discourse Parameters	 Z 	p value
Overall Conversational Propositional - Conversational Non propositional	5.14	0.00*
Conversation Propositional parameters		
Conversational Discourse structure – Conversational communication intent	3.77	0.00*
Conversational Discourse structure – Conversational Topic management	2.44	0.015*
Conversational Discourse structure- Conversational other speech parameters	2.42	0.015*
Conversational Communication intent- Conversational Topic management	1.60	0.109
Conversational Communication intent- Conversational other speech parameters	2.01	0.044*
Conversational Topic management- Conversational other speech parameters	0.33	0.741
Conversation Non- Propositional parameters		
Conversational Topic management – Conversational Repair behaviors	4.27	0.000*

Note: * $p < 0.05$.

Hence, from the above Table 4.1.2, Wilcoxon’s signed Rank test (pair wise comparison) revealed significant difference between overall Conversational propositional versus Conversational non-propositional aspects at $p < 0.05$, wherein on observing the mean values, the individuals with dementia performed better in propositional aspects of conversation. Further, pair wise comparison of sub domains of propositional aspect of conversational discourse revealed, significant difference between Conversational Discourse structure – Conversational communication intent, Conversational Discourse structure – Conversational Topic management, Conversational Discourse structure- Conversational other speech parameters and Conversational Communication intent- Conversational other speech parameters at $p < 0.05$ level of significance. The mean scores of these parameters showed, throughout discourse structure and coherence was better compared to all other parameters of conversational propositional speech. Other speech parameters of propositional speech were better compared to conversational communication intent. Wilcoxon’s signed rank test of sub parameters within conversational non-propositional speech revealed significant difference between conversation topic management versus conversational repair and revision behaviors, wherein turn taking abilities were found to be better compared to revision behaviors.

4.2. Qualitative analysis of parameters within Narration discourse genre.

The propositional and non- propositional aspects of narration sample of each participant was analyzed using standard discourse analysis scale. Within propositional aspect parameters analyzed were coherence and discourse structure, communication intent, topic management, other parameters of speech and under non propositional aspect turn taking skills and revision and repair skills were analyzed. Descriptive statistics was applied in terms of mean, median, standard deviation on these parameters and results are shown in the Table 4.2.1 below.

Table 4.2.1: *Mean, Median and Standard deviation of Narration Proposition and Non propositional aspects*

Discourse parameters	Mean	Median	S.D
Narration Propositional scores	31.96	33.33	4.60
Narration Non proposition scores	5.00	10.00	5.00
Narration Propositional parameters			
Narration discourse structure and coherence	27.08	25.00	8.18
Narration communication intent	25.00	25.00	8.44
Narration topic management	32.17	37.50	11.64
Other speech parameters	36.63	37.50	7.34

On observing the mean and median of propositional and non-propositional aspects of narration, it was noted that propositional aspects of narration were better in individuals with dementia compared to non-propositional aspects. Hence, individuals with dementia had better narrative propositional skills when compared to narrative non-propositional aspects. Further to note significant difference among these parameters, non-parametric tests were applied (since the data was not normally distributed). Friedman Test revealed there is significant difference ($\chi^2=21.60$, $df =3$, $p=0.00$) within the parameters of propositional and non-propositional aspects of narration. Further, pair wise comparison was done and results are as shown in the Table 4.2.2 below.

Table 4.2.2: Results of Wilcoxon’s Signed Rank Test for Propositional and non-propositional aspects of Narration.

Discourse Parameters	 Z 	p value
Overall Narrative Propositional - Narrative Non propositional	5.23	0.000*
Narrative Propositional parameters		
Narrative Discourse structure – Narrative communication intent	0.86	0.385
Narrative Discourse structure – Narrative Topic management	1.75	0.079
Narrative Discourse structure- Narrative other speech parameters	4.15	0.000*
Narrative Communication intent- Narrative Topic management	2.73	0.006*
Narrative Communication intent- Narrative other speech parameters	4.11	0.000*
Narrative Topic management- Narrative other speech parameters	1.23	0.217

Note: * $p < 0.05$.

Hence, from the above Table 4.2.2, Wilcoxon’s signed Rank test (pair wise comparison) revealed significant difference between overall Narrative propositional versus Narrative non-propositional aspects at $p < 0.05$, wherein on observing the mean values, the individuals with dementia performed better in propositional aspects of narration. Further, pair wise comparison of sub domains of propositional aspect of narration revealed, significant difference between Narrative Discourse structure- Narrative other speech parameters, Narrative Communication intent- Narrative Topic Management and Narrative Communication intent- Narrative other speech parameters at $p < 0.05$ level of significance. The mean scores of these parameters showed, performance in narrative other speech parameters was better compared to all other parameters of narrative propositional speech. Within narrative communication intent and narrative topic management, mean scores of topic management was better. Wilcoxon’s signed rank test of sub parameters within narrative non-propositional speech could not be studied statistically since the sub parameters of non-propositional narrative speech was very limited and not sufficient to run comparison on statistical tests. However, the overtly on comparing the mean scores, propositional aspects of narrative speech was found to be better in individuals with dementia when compared to non-propositional aspects (from Table 4.2.1).

4.3. Qualitative analysis of parameters of Picture Description discourse genre.

The propositional and non- propositional aspects of picture description sample of each participant was analyzed using standard discourse analysis scale. Within propositional aspect parameters analyzed were coherence and discourse structure, communication intent, topic management, other parameters of speech and under non propositional aspect turn taking skills and revision & repair skills were analyzed. Descriptive statistics was applied in terms of mean, median, standard deviation on these parameters and results are shown in the Table 4.3.1 below.

Table 4.3.1: *Mean, Median and Standard deviation of Picture description Proposition and Non propositional aspects*

Discourse parameters	Mean	Median	S.D
Picture description Propositional scores	22.40	21.43	4.11
Picture description Non proposition scores	19.16	20.00	6.91
Picture Description Propositional parameters			
Picture description discourse structure and coherence	42.36	37.50	12.05
Picture description communication intent	31.54	28.57	7.11
Picture description topic management	32.63	31.25	8.72
Picture description Other speech parameters	33.10	33.33	7.89

On observing the mean and median of propositional and non-propositional aspects of Picture description task, it was noted that propositional aspects of picture description were better in individuals with dementia compared to non-propositional aspects. Hence, individuals with dementia had better picture description propositional skills when compared to non-propositional aspects. Further to note significant difference among these parameters, non-parametric tests were applied (since the data was not normally distributed). Friedman Test revealed there is significant difference ($\chi^2=18.82$, $df=3$, $p=0.00$) within the parameters of propositional and non-propositional aspects of picture description. Further, pair wise comparison was done and results are as shown in the Table 4.3.2 below.

Table 4.3.2: Results of Wilcoxon’s Signed Rank Test for Propositional and non-propositional aspects of Picture Description (PD).

Discourse Parameters	 Z 	p value
Overall PD Propositional - PD Non propositional	2.50	0.012*
Picture Description Propositional parameters		
PD Discourse structure – PD communication intent	4.10	0.000*
PD Discourse structure – PD Topic management	0.15	0.875
PD Discourse structure- PD other speech parameters	3.78	0.000*
PD Communication intent- PD Topic management	1.14	0.253
PD Communication intent- PD other speech parameters	0.323	0.747
PD Topic management- PD other speech parameters	3.35	0.001*

Note: * $p < 0.05$.

Hence, from the above Table 4.3.2, Wilcoxon’s signed Rank test (pair wise comparison) revealed significant difference between overall Picture description propositional versus Picture description non-propositional aspects at $p < 0.05$, wherein on observing the mean values, the individuals with dementia performed better in propositional aspects of Picture description. Further, pair wise comparison of sub domains of propositional aspect of Picture description revealed, significant difference between Picture description Discourse structure versus Picture description communication intent and other speech parameters, Picture description Topic management versus other speech parameters at $p < 0.05$ level of significance. The mean scores of these parameters showed, performance in Discourse structure and coherence of picture description was better compared to all other parameters of Picture description propositional speech. Within Picture description topic management and other parameters of picture description, mean scores of other parameters of speech was better. Wilcoxon’s signed rank test of sub parameters within non-propositional speech of Picture description could not be studied statistically since the sub parameters of non-propositional Picture description speech were very limited and not sufficient to run comparison on statistical tests. However, the overtly on comparing the mean scores, propositional aspects of Picture description speech was found to be better in individuals with dementia when compared to non-propositional aspects (from Table 4.3.1).

4.4. Comparison of overall discourse scores across conversation, narration and picture description performances.

The complex discourse production was assessed across three discourse genres, namely, conversation, narration and picture description. All these three samples of each participant were analyzed using standard discourse analysis scale. Apart from propositional and non-propositional aspects of these three genres, the overall discourse scores for each of these was computed and subjected to statistical analysis. Descriptive statistics was applied on these overall discourse scores of conversation, narration and picture description samples and results are shown in the Table 4.4.1 below.

Table 4.4.1: *Mean, Standard deviation of overall discourse scores of Conversation, Narration and Picture Description*

Discourse parameters	Mean	S.D
Conversation	29.91	3.66
Narration	26.59	3.43
Picture Description	20.43	3.31

Hence, from Table 4.4.1 it was noted that individuals with dementia performed best in conversation task when compared to narrative and picture description tasks, followed by better performance in narration compared to picture description task. The data was further subjected to parametric t test analysis since these parameters abided the properties of normal distribution. One way repeated measures ANOVA was applied to compare the overall discourse scores across conversation, narration and picture description tasks. Results revealed significant difference across these three parameters ($F= 73.51$, $df =2$, $p=0.00$). Further, pair wise comparison was done using Bonferroni test and results are as shown in the Table 4.4.2 below.

Table 4.4.2: *Results of Bonferroni test of pair wise comparison of Conversation, Narration and Picture description.*

Discourse Parameters	Mean difference	p value
Conversation versus Narration	3.32	0.00*
Conversation versus Picture description	9.48	0.00*
Narration versus Picture description	6.15	0.00*

*Note: *p < 0.05*

Thus, from Table 4.4.1 and 4.4.2, it was noted that conversation abilities of individual with dementia significantly varied with narration and picture description tasks. Further, on comparing narrative abilities and picture description task, the overall performance in narration was better compared to picture description task.

Further, the overall propositional aspects of conversation was compared with narration and picture description performance using Wilcoxon's Signed Rank test (since data was not normally distributed) and results revealed as shown in table 4.4.3 below.

Table 4.4.3: Results of Wilcoxon's Signed Rank Test for Propositional speech across Conversation, Narration and Picture description

Discourse Parameters	Z	p value
Conversation propositional- Narration Propositional	1.19	0.231
Conversation propositional- Picture description Propositional	5.23	0.000*
Narration Propositional- Picture description Propositional	5.17	0.000*

Note: * $p < 0.05$

Results revealed significant difference in performance of individuals with dementia in conversational propositional aspect and picture description propositional aspect, wherein they performed better in conversation proposition. Also, significant difference was noted between narrative propositional task and picture description propositional tasks and on comparing the mean scores narrative propositional was found to be better. Similarly, the non-propositional aspects of conversation, narration and picture description were compared and results are as tabulated below in Table 4.3.4.

Table 4.4.3: Results of Wilcoxon's Signed Rank Test for Non-Propositional speech across Conversation, Narration and Picture description

Discourse Parameters	Z	p value
Conversation Non- propositional- Narration Non propositional	5.25	0.000*
Conversation Non - propositional- Picture description Non- Propositional	1.60	0.109
Narration Non -Propositional- Picture description Non- Propositional	4.98	0.000*

Note: * $p < 0.05$

Results revealed significant difference in performance of individuals with dementia in conversational Non propositional aspect versus Narration Non propositional aspect, wherein they performed better in conversation Non proposition. Also, significant difference was noted between narrative Non propositional task and picture description Non propositional tasks, and on comparing the mean scores, narrative Non propositional discourse was found to be better.

Hence, to summarize, the complex discourse production of 38 individuals with dementia were analyzed across conversation, narration and picture description tasks. The discourse samples were qualitatively analyzed and performance differences were studied using statistical analysis. The sub parameters of these three discourse genres namely coherence & discourse structure, communication intent, topic management and other parameters of speech within propositional and turn taking skills and revision & repair skills

were analyzed under non-propositional aspects. On studying the propositional and non-propositional aspects of conversation, results revealed individuals with dementia performed better in propositional aspects. On examining within conversational propositional aspects, their performance was best in discourse structure and coherence compared to the rest sub parameters of conversational proposition. Turn taking abilities was found to better in these individuals when compared with conversational repair behaviors under Non propositional aspects. Similarly, Narrative skills were analyzed statistically and results revealed that Narrative propositional aspects were better compared to Non propositional aspects. Further, under narrative propositional aspects, Narrative Topic management abilities were better compared to rest of the propositional aspects. Consequently, the propositional and non-propositional aspects of Picture description task, revealed better performance in Propositional picture description like in conversation and narration tasks. Further, within propositional aspects of picture description showed better performance in discourse structure and coherence compared to rest of the propositional aspects of picture description.

CHAPTER V

DISCUSSION

The present study aimed to validate the Discourse Analysis Scale (DAS) in Adults with Dementia. The participants included for the study were 40 individuals with dementia in the age range of 40 and above years. All individuals were native speakers of Kannada language and both males and females participated in the study. The discourse samples spoken in Kannada language were audio- video recorded across three tasks, namely; Conversation, Narration and Picture description. Further, the all three samples of each individual were analyzed using Discourse Analysis Scale. The analysis was done with respect to a) overall discourse scores of individuals with dementia across conversation, narration and picture description tasks b) and propositional – non propositional aspects within conversation, narration and picture description tasks. Further, the data was subjected to appropriate statistical analysis and results are discussed in the following headings:

5.1 Conversational discourse genre of individuals with Dementia at Propositional and Non propositional aspects.

5.2 Narrative discourse genre of individuals with Dementia at Propositional and Non propositional aspects.

5.3 Picture description discourse genre of individuals with Dementia at Propositional and Non propositional aspects.

5.4 Comparison of overall discourse production across Conversation, Narration and Picture description in adults with Dementia.

5.5 Conclusion

5.1 Conversational discourse genre of individuals with Dementia at Propositional and Non propositional aspects.

From Table 4.1.1 and 4.1.2, it was found that the individuals with dementia performed significantly better in conversational propositional aspect when compared to conversational Non propositional aspects on analyzing the overall propositional and non-propositional scores of conversation task. Further, the sub parameters of propositional and non- propositional aspects of discourse were studied in detail. The sub parameters studied under propositional speech were: a) ‘Coherence and discourse structure’ b) ‘Communication intent’ c) ‘Topic management’ d) ‘other speech related parameters’ (which comprised of information adequacy, information content, message accuracy, vocabulary specificity, speech style, intonation, gaze efficiency and response time). Under Non propositional aspects of conversation, the sub parameters studied were: a) ‘Turn taking abilities’ and b) ‘revision behaviors’.

5.1.1 Conversation Proposition

On comparing the discourse production abilities within conversation proposition, it was noticed that there was a significant difference between ‘coherence and discourse structure’ compared to ‘Communication intent’, ‘Topic management’ and ‘other speech related parameters’. That is, individuals with dementia performed poorer in ‘Communication intent’, ‘Topic management’ and ‘other speech related parameters’ aspect within conversation propositional speech. The contributing factors for this finding could be 1) Nature of the task 2) Working memory 3) Cognitive load 4) Executive function skills or cognitive functional abilities 5) Length of discourse sample.

In the study individuals with dementia exhibited poorer conversational discourse production in terms of topic management and topic maintenance. *Topic maintenance* refers to an essential level of organization in conversation, and it is necessary for the construction of a coherent conversation. According to Mentis and colleagues (1995) it is critical for the establishment and maintenance of social interactions and relations (Mentis et al., 1995). Study by Bourgeois (1991) ascertained that these areas become disordered in individuals with Dementia. According to Perkins and colleagues (1998) an individual's syntactic, semantic, psychological, and linguistic systems play a major role in topic maintenance. They aid establishment of cohesive ties, and they limit the use of confabulatory utterances. These systems are often disordered in patients with DAT, making topic maintenance problematic. Due to the cognitive deficits present in DAT, more trouble sources may appear in their conversations. Another reason for poor ‘topic management’ in individuals with dementia could be due to poor planning and programming which is underlined by decline in working memory abilities. Also, the cognitive load involved in maintaining the topic is much more taxing for persons with dementia and this becomes another contributing factor for poor ‘topic management’ abilities. Alternatively, these behaviours may be attributed to cognitive slowing in the participant with dementia, which may compromise their ability to ‘secure the conversational floor or to hold onto it’ (Perkins *et al.* 1998).

Further, in the study, ‘*communication intent*’ among persons with dementia was found to poor compared to rest of the sub parameters. This could be attributed to cognitive decline, behavioral signs and symptoms. According to Guendouzi and Muller (2005) and Hamilton (1994) these aspects affect the ability of persons with dementia to participate in everyday conversation. In their study family members reported experiencing poor or least intent to communicate which resulted in decreased collaborative success of communication. Hence impaired ‘communication intent’ could be due to ‘frustration, loneliness, guilt, embarrassment and social isolation’ as suggested by Byrne and Orange (2005) study.

The ‘*coherence and discourse structure*’ is found to be better compared to other sub parameters of conversation due to ease and nature of task and length of discourse output. Since the task was conversational discourse, it was observed that individual with dementia were much comfortable to converse and responded well due to ease and nature of speech being related to their own experiences, thoughts and opinion. Hence, the cohesive aspects like ‘Global cohesion’ and ‘Local cohesion’ along with ‘discourse structure’ were found to be

relatively better due to ease of topic being spoken and nature of discourse being one to one exchange of thoughts and opinion rather than being monologue, which further made the subjects much comfortable and thus perform better in these aspects. **Another** reason for '*cohesion and discourse structure*' being better could be the micro linguistic nature of the aspects involve in this parameter. Glosser and Deser (1991) suggested anaphora and lexical production errors and syntactic error and syntactic complexity are the micro-linguistic aspects of discourse and no significant age differences on use of lexical cohesive ties between neuro-typical old adults and persons with dementia .

Third reason for better '*cohesion and discourse structure*' could be short length of discourse. Since, the nature of discourse was conversation, the persons with dementia were frequently intervened by the examiner with questions, and the length of discourse was smaller comparatively to narration and picture description, which necessitated two way interactions with many 'wh' questions rather than monologue type of discourse. Since this involved dialogues, the subjects performed better due to short nature of the discourse. According to Cummings (2000), syntactic complexity in persons with dementia appears relatively spared in mild stage. Such complexity in speech challenges the act of detecting decrements in communicative ability. Hence to a casual listener, decreased length of output and sparseness of thematic detail may be misunderstood as structurally complete sentence pattern. This supported previous studies that phonological and syntactic abilities are spared in early dementia (Bayles, 1982; Bayles, Kaszniak & Tomoeda, 1987).

5.1.2 Conversation Non Proposition

In the study the conversational discourse was analyzed across sub parameters of non-propositional aspects of conversation ('*turn taking*' and '*conversation repair strategies*'). Overall poor turn taking skills was noted in the conversation task and specifically between '*turn taking*' and '*conversation repair strategies*', individuals with dementia performed poorer in '*conversation repair strategy*'. Poor '*turn taking*' skills can be attributed to decline in memory, language processing and other cognitive function among persons with dementia. According to Sacks, Schlegloff, and Jefferson (1978), *turn taking* is a system that organizes conversational activity. It allows a conversation to run smoothly and give each person the time needed to convey their whole message (Perkins, 1995). Turn taking may be impaired in an individual with dementia, due to the underlying problems with responding quickly enough while conversing, resulting in longer silences than usual. This may be due to deficits such as inattention, linguistic processing difficulties, or slowed cognitive processing (Perkins et al., 1998). Another reason could be attributed to extended pausing and overlap which could result in poor turn-taking abilities. This is supported by Heldner and Edlund study in (2010).

On contrary, '*turn taking*' is better than '*conversation repair strategies*'. This can be attributed to ease and less complex nature of the task and secondly due to shorter length of utterances used in conversation task. This is in consensus with study by Hamilton in 1994, who did quantitative research into turn taking in dementia and suggested that turn-taking skills are largely preserved across all stages of dementia. *Conversational repair* refers to the efforts of conversational partners to correct and resolve misunderstandings or mishearing

(Orange, Lubinski, & Higginbotham, 1996). Individuals with DAT may be unable to repair their own or their conversational partner's speech, as a high level of linguistic skill is required in repair and the higher level of pragmatic skills to overcome the underlying cognitive deficits. This was in support with study by Perkins and colleagues in 1998. Hence, with the progression of dementia, monitoring one's own understanding becomes difficult.

5.2 Narrative discourse genre of individuals with Dementia at Propositional and Non propositional aspects.

From Table 4.2.1 and 4.2.2, it was found that the individuals with dementia performed significantly better in narrative propositional aspect when compared to narrative Non propositional aspects on analyzing the overall propositional and non-propositional scores of narration task. Further, the sub parameters of propositional and non- propositional aspects of discourse were studied in detail. The sub parameters studied under propositional speech were: a) 'Coherence and discourse structure' b) 'Communication intent' c) 'Topic management' d) 'other speech related parameters' (which comprised of information adequacy, information content, message accuracy, vocabulary specificity, speech style, intonation, gaze efficiency and response time).

In this task, individuals with dementia performed better in narrative propositional aspects compared to narrative non propositional aspects like seen in conversation task. This again can be attributed to 1) nature task 2) cognitive processes involved 3) length and complexity of task. Hence, individuals with dementia perform poorer in non-propositional aspects of narrative discourse due to monologue nature of discourse involved, where the examiners interruption and contribution is minimal. Thus, persons with dementia tend to perform poorer in 'turn taking' and use minimal 'conversation repair' strategies. Also, due to poor planning and execution as discussed in the previous section along with poor working memory, individuals with dementia cannot monitor and repair their utterances in narration task. Third reason could be attributed to comparative high complex nature of the task and lengthier utterances necessitate persons with dementia to perform poorer in non-propositional aspects of narrative discourse.

5.2.1 Narrative Proposition and Non-Proposition

In the study, individuals with dementia performed poorer in '*cohesion and discourse structure*' & '*communication intent*' compared to other sub parameters of narrative discourse. This can be attributed to 1) nature of task 2) working memory 3) episodic memory 4) Attention.

The '*cohesion and discourse structure*' was found to be impaired in persons with dementia. **Firstly**, this can be attributed to nature of task, where the person with dementia is required to narrate the events in sequence. Such task is more cognitively tasking since a strict serial or sequence has to be followed. This further necessitates planning and programming the speech output, which is compromised in these individuals. **Second** reason could be the

deficit in working memory. Memory problems are typically the first signs of cognitive decline among individuals with dementia. The memory problems often result in problem behavior which can be explained by failure at different points in memory processing. Working memory (WM) is the ability to actively hold information in the mind needed to do complex tasks such as reasoning, comprehension and learning. There is evidence of reduced memory span and short term memory (STM) capacity in dementia (Morries, 1986). They have increased rate of forgetting (Au, Chan & Chin, 2003). They exhibit encoding deficits (Kesner, 1998). They have impairment in the ability to learn performance with curing (Werheid, Hoppe, Thöne, Müller, Müngersdorf, & von Cramon, 2002). Hence, the narrative ‘*cohesion and discourse structure*’ is impaired.

Third contributing factor could be impaired episodic memory. Episodic memory refers to memory related to autobiographical events like time, place, associated emotions, and other contextual knowledge. Along with working memory, episodic memory is also affected with respect to disease progression because, it necessitates to encode new information frequently while explaining new events in persons with dementia. This finding is in consensus with Caselli & Yangihara (1991). **Fourth** factor could be poor attention skills in persons with dementia. Persons with dementia have difficulty in more complex tasks which require divided attention (Perry & Hodge, 1999). Hence, ‘*cohesion and discourse structure*’ in narrative discourse is poorer since it necessitates active attention skills.

On contrary, the ‘*topic management and other speech parameters*’ of narrative discourse were better since attention for selecting and sustaining which are known to be simple tasks are not typically impaired in early dementia (Assal & Cummings, 2003). Individuals also have preserved performance on sustained attention. Hence in these terms narrative propositional discourse varies across the above sub parameters due to decline in cognitive functioning. The parameters of non-propositional aspects were the use of ‘revision behavior’ and use of ‘repair strategies’. With reference to the raw score, it is observed that the participants with Dementia could not use self corrections, repair through repetition/revision/other initiated corrections and request for clarifications.

5.3 Picture description discourse genre of individuals with Dementia at Propositional and Non propositional aspects.

From Table 4.3.1 and 4.3.2, it was found that the individuals with dementia performed significantly better in propositional aspect of picture description when compared to Non propositional aspects of picture description on analyzing the overall propositional and non-propositional scores of picture description task. Further, the sub parameters of propositional and non- propositional aspects of picture description discourse were studied in detail. The sub parameters studied under propositional speech were: a) ‘Coherence and discourse structure’ b) ‘Communication intent’ c) ‘Topic management’ d) ‘other speech related parameters’.

On overall analysis of propositional and non-propositional aspects of picture description task, the non-propositional aspect was found to be poorer. The contributing factors could be 1) structured nature and complexity of task, 2) cognitive load and 3) neuropsychological changes in dementia. Firstly, since the task involves description of picture, the nature of discourse is typically monologue where the participants had to explain solely on what he/she visually perceives and express in words. Hence, secondly, the task necessitates high cognitive load to process, imagine and express. Thirdly, the length of utterance used will be usually broken, since the picture description is done one by one. Even in these instances of monologue, the participants did not make an attempt to ‘use repair strategies’ and ‘turn taking’ was completely out of context. Hence, all these reasons may account for poorer non propositional skills (‘turn taking’ and ‘use of repair strategies’) in persons with dementia compared to propositional aspects.

5.3.1 Propositional and non-propositional speech in Picture description

Within propositional aspects, ‘*cohesion and discourse structure*’ was better compared to all other sub parameters and ‘*communication intent*’ was found to be most impaired compared to other sub parameters. This can be attributed to 1) semantic memory deficit 2) word finding deficits 3) behavioral issues. In the study ‘*communication intent and topic management*’ were relatively impaired in individuals with dementia. One of the contributing factors could be semantic memory deficit. Semantic memory refers to the enormous storehouse of information that humans have readily accessible. To explain in brief, semantic memory is the ability of an individual in conscious recollection of factual information and general knowledge about the world. These are found to be affected in adults with dementia. Simultaneously, connecting the thoughts, maintaining the discourse in the topic and usage of appropriate word are all impaired in these individuals. This disrupts the fluency of speech. Many word retrieval difficulties are also noted while describing the pictures. Chertkow, Bub, and Seidenberg (1989) studied in DAT group, to check whether verbal fluency impairment accurately reflected the loss of semantic memory. Results revealed that verbal fluency was impaired as a resultant of two major constraints; decline in semantic memory store, and varying impairment in semantic search. Hence, the authors opined that verbal fluency mirrors loss in semantic memory to a certain degree. Another reason for poor ‘*communication intent*’ among persons with dementia could be attributed to cognitive decline, behavioral signs and symptoms.

As mentioned before, the other contributing factor could be the neuropsychological processes which includes the executive function (Mar, 2004; Troiani et al., 2008; Cannizzaro & Coelho, 2013), episodic memory (Chapman et al., 2002; Taler & Phillips, 2008) and semantic-pragmatic component of language (Fonseca et al., 2008; Troiani et al., 2008) which is associated with the narrative production. Distinguishing the limits of these different executive functions on narration task is a challenge for clinicians and researchers. It is very difficult to demarcate the boundaries of these different cognitive processes according to Lezak et al. (2012). But the discourse analysis assesses the integration of these cognitive processes. The discourse tasks involved in the assessment of the narrative productions of

elderly individuals are often based on an illustrated story without a text, a narrative of picture description (chosen from a storybook or a sequential action) or a recitation of a heard story. Juncos-Rabadan, Pereirob, Rodri'guez (2005) confirmed that aging decrease the density of informational content and cohesive reference of narratives whereas increases quantity and the units of irrelevant content in their narrative speech. This could have contributed for the poor score for the parameter 'topic management'. Hence in these terms the individual with dementia performed poor in 'communication intent' and 'topic management' in picture description propositional aspects. There was nothing significant to comment on the non-propositional aspects of picture description task.

5.4 Comparison of overall discourse production across Conversation, Narration and Picture description in adults with Dementia

From Table 4.4.1 and 4.4.2, it was noted that conversation abilities of individual with dementia significantly varied with narration and picture description tasks, where performance in narration and picture description tasks was relatively poorer than conversation task. Further, on comparing narrative abilities and picture description task, the overall performance in narration was better compared to picture description task. Hence, poorest performance was noted in picture description task. These differences in performance by individuals with dementia can be attributed to 1) varied nature and complexity in the tasks 2) varied cognitive load 3) executive functioning 4) word retrieval deficits 5) abstract thinking and reasoning 6) Visual perception deficits 7) deficits in planning, programming, organization and cognitive flexibility.

As discussed earlier, each task (conversation, narration and picture description) *vary in the nature* of discourse genres, where conversation involve dialogue, narration and picture description is mainly monologue. Due to this reason, the ease of discourse elicitation is easy and less complex in case of conversation task when compared to narration and picture description tasks. Hence, performance in conversation could have been better for this reason.

Secondly, each of these tasks necessitated *varied level of cognitive load*, again based on ease and complexity. Hence, conversation being easy and less complex involved least cognitive load and picture description on the other hand is assumed to have higher cognitive load. This is in consensus with study by Wright et al. (2014), who found that type of elicitation task also influenced maintenance of global coherence, possibly because different elicitation tasks varied in cognitive demands.

Third reason for poor performance in narration and picture description could be deficits in *executive functions*. Planning, shifting, mental set, inhibiting incorrect responses, manipulating new information, violating purposive action, self-monitoring are the components of Executive Function (Assal & Cummings, 2003). As known, narration and picture description tasks are highly depend on planning, manipulation of known information, self-monitoring their speech, sequencing their discourse and initiation of speech and these are monitored by active functioning of executive functioning. Hence, the deficit in executive function results in poor performance in narration and picture description tasks.

Forth reason for poor narrative and picture description could be due to underlying *word retrieval deficits*. Word finding deficits result in poor initiation of discourse, information content is reduced; information inadequacy is seen along with poor message accuracy. Various studies have reported word- finding difficulties and a decline in semantic abilities in persons with DAT (Light, 1992; Kempler & Zelinski, 1994). To mention few, many structured tasks were used to assess persons with DAT, such as confrontation naming (Bayles, 1982; Bayles & Kaszniak, 1987, Hodges, Salmon, & Butters, 1991), single word production (Martin & Fedoi, 1983), or generation of words beginning with a certain letter (Philips, Sala & Trivelli, 1996). Hence, due to word finding difficulties, the individuals with dementia perform poor in narrative and picture description tasks compared to conversation.

Yet another factor assumed to affect the narrative and picture description tasks could be *abstract thinking and reasoning*. An impairment of abstract thinking and problem solving and a deficient ability to shift or maintain set are often prominent clinical features of dementia (Cummings & Benson, 1992). These deficits are usually caused due to the neuropathological changes in the association cortex of the persons with dementia. These problems are present differently across the stages of dementia and are more prominent in the middle stage of the disease. Freedman and Oscar- Berman (1986) studied the problem solving impairment in persons with dementia using a tactile discrimination test. The impaired performance in these people resulted from the deficiency in the cognitive flexibility that is required to alternate responses and shift mental set. Therefore, due to reduced abstract thinking and problem solving individuals with dementia perform poor in narrative and picture description tasks.

Sixth factor affecting picture description task could be *visual perception deficits*. In the study poor performance in picture description task was evident from use of short- broken phrases, jumbled speech, excessive pauses and extensive strain to comprehend the picture and all these could be due to poor visual perceptual abilities. This is in consensus with study by Mosimann, Mather, Wesnes, O'Brien, Burn, and McKeith (2004), which used a cross-sectional study to compare three groups of persons with dementia matched for overall dementia severity and two age, sex, and education matched normal groups. Visual perception was globally more impaired in Parkinson's Diseases Dementia than in normal, but was not different from Dementia of Levy Bodies. Compared to persons with Alzheimer's Diseases, persons with Parkinson's Diseases Dementia tend to perform worse in all perceptual scores.

Lastly, *deficits in planning programming, organization and cognitive flexibility* can be another major contributing factor for diminished narrative and picture description abilities in persons with dementia. Due to this factor persons with dementia cannot sequence their speech output or maintain continuity in their narrative and picture description task. Further, results in overall poor global coherence and poor richness in vocabulary used in these two tasks. This discussion is well supported by Cummings (2000), who opined that persons with dementia group's inability to produce the discourse with rich vocabulary seemed to highlight decreased planning, organization and cognitive flexibility skills which are the hallmark of dementia. Crawford, 1998 and Godefroy (2003) further proposed that planning, organization and cognitive flexibility are important components of executive functions and they have been

shown to influence discourse production in traumatic brain injury (Coelho, Liles & Duffy, 1995). However, it is beyond the scope of the present study to determine specifically how executive function will influence the discourse or word retrieving abilities. Additionally persons with dementia lack cognitive inference ability. Hence due to all these factors persons with dementia performed better in conversation discourse and comparatively poor in narrative and picture description tasks.

SUMMARY AND CONCLUSIONS

With reference to the individuals with Dementia, there is a need to assess the correlation which teases out the exact relationship between discourse and cognition. According to Ralph et al, 2001, degradation of semantic networks is the main characteristic of individuals with Dementia. Where they exhibit difficulty in confrontation naming and show poor score on semantic verbal fluency on standardized testing (Zakzanis, Leach & Kaplan, 1999). This language decline is accompanied with the decline in other cognitive domains in contrast to the language breakdown seen in aphasia. Hence, individuals with Dementia need discourse assessment in the context of their affected cognitive domain (Almor, Kempler, MacDonald, Andersen & Tyler, 1999).

Therefore process of validation of the Discourse Analysis Scale in population with Dementia might show that the role of cognition in discourse production might partly be determined by the context in which communication takes place or the type of pathology the individuals are diagnosed with. Since, study by March, Pattison and Wales (2009) assessing the interplay between cognition and discourse depends fundamentally on the role of communicative context. Across different discourse genres the correlation between cognition and discourse vary differently. This implements the idea of essential multiple discourse task being a pre-requisite to acknowledge the relation between cognition and discourse which covers the different properties and demands of different communicative context.

Thus, the present study was aimed to validate the existing Discourse Analysis Scale in Adults with Dementia. A total of 40 adults with dementia in the age range of 40 and above years were considered for the present study. The objectives of the study were,

1. To validate the Discourse Analysis Scale (DAS) on individuals with Dementia exhibiting cognitive communicative deficits.
2. To evaluate the effectiveness of DAS in assessment of discourse of individuals with Dementia exhibiting cognitive communicative disorders.
3. To evaluate the effectiveness of DAS by discussing the co-relation between discourse abilities and the underlying cognitive functions.

Use of Discourse Analysis Scale (DAS) will enable to identify cognitive communicative deficits in clinical population with diverse brain insults despite passing on traditional language tests. DAS is an extensive test of discourse with less effort, follows non-invasive procedure and doesn't require high cost equipments. Cognitive communicative deficits in clinical populations of Adults with Dementia will be made aware of their discourse impairment through this assessment and later facilitate intervention at discourse since they are not aware of their impairment at discourse level. Since cognitive communicative disordered populations "talk better than they communicate", certain cognitive aspects influence communication at discourse level. On administration of discourse analysis scale these cognitive aspects are outlined. The DAS will be helpful in estimating the prevalence of

the cognitive communicative disorders/deficits in Indian population with Dementia. As an initial attempt the present study focused on the validation of DAS on individuals with Dementia.

Thus, the results of descriptive statistics delineate the mean, median and standard deviation for sub-parameters of discourse under propositional and non-propositional aspects for a total of 40 adults with Dementia. Conversation abilities of individual with dementia significantly varied with narration and picture description tasks, where performance in narration and picture description tasks was relatively poorer than conversation task. Further, on comparing narrative abilities and picture description task, the overall performance in narration was better compared to picture description task. Hence, poorest performance was noted in picture description task. These differences in performance by individuals with dementia can be attributed to factors like: 1) varied nature and complexity in the tasks 2) varied cognitive load 3) executive functioning 4) word retrieval deficits 5) abstract thinking and reasoning 6) Visual perception deficits 7) deficits in planning, programming, organization and cognitive flexibility.

The ease of discourse elicitation is easy and less complex in case of conversation task when compared to narration and picture description tasks. Conversation being easy and less complex involved least cognitive load and picture description on the other hand is assumed to have higher cognitive load. As known, narration and picture description tasks are highly depend on planning, manipulation of known information, self-monitoring their speech, sequencing their discourse and initiation of speech and these are monitored by active functioning of executive functioning. Hence, the deficit in executive function results in poor performance in narration and picture description tasks. The other possible reason could be due to word finding difficulties; because of which the individuals with dementia perform poor in narrative and picture description tasks compared to conversation.

The impaired performances in these people result from the deficiency in the cognitive flexibility that is required to alternate responses and shift mental set. Therefore, due to reduced abstract thinking and problem solving individuals with dementia perform poor in narrative and picture description tasks. In the present study poor performance in picture description task was evident from use of short- broken phrases, jumbled speech, excessive pauses and extensive strain to comprehend the picture and all these could be due to poor visual perceptual abilities. However, it is beyond the scope of the present study to determine specifically how executive function will influence the discourse or word retrieving abilities. Additionally persons with dementia lack cognitive inference ability. Hence due to all these factors persons with dementia performed better in conversation discourse and comparatively poor in narrative and picture description tasks.

Individuals with dementia performed significantly better in propositional aspect when compared to Non propositional aspects in conversation, narration and picture description task. The contributing factors could be 1) structured nature and complexity of task, 2) cognitive load and 3) neuropsychological changes in dementia. The neuropsychological processes which includes the executive function (Mar, 2004; Troiani et al., 2008; Cannizzaro

& Coelho, 2013), episodic memory (Chapman et al., 2002; Taler & Phillips, 2008) and semantic-pragmatic component of language (Fonseca et al., 2008; Troiani et al., 2008) are associated with the discourse production at propositional and non-propositional level of conversation, narration and picture description task.

With reference to conversation proposition, individuals with dementia performed poorer in 'Communication intent', 'Topic management' and 'other speech related parameters'. On the sub parameters of narrative discourse individuals with dementia performed poorer in '*cohesion and discourse structure*' & '*communication intent*'. Within propositional aspects of picture description task, '*cohesion and discourse structure*' was better compared to all other sub parameters and '*communication intent*' was found to be most impaired compared to other sub parameters. This can be attributed to the following factors like: 1) nature, length and complexity of task, 2) working memory, 3) episodic memory, 4) Attention, 5) semantic memory deficit, 6) word finding deficits 7) behavioral issues. The contributing factors for this finding could be 1) Working memory, 2) Cognitive load 3) Executive function skills or cognitive functional abilities 4) Length of discourse sample.

With reference to non-propositional aspects of discourse, overall poor turn taking skills was noted in the conversation task and specifically between 'turn taking' and 'conversation repair strategies', individuals with dementia performed poorer in 'conversation repair strategy'. Poor '*turn taking*' skills can be attributed to decline in memory, language processing and other cognitive function among persons with dementia. These participants also performed poorer in non-propositional aspects of narrative discourse due to monologue nature of discourse involved, where the examiners interruption and contribution is minimal. Thus, persons with dementia tend to perform poorer in 'turn taking' and use minimal 'conversation repair' strategies. In picture description task, the non-propositional aspect was found to be poorer. Since this task was a semi structured monologue with definite contents to express during the verbal description of the picture. Individuals with dementia did not make an attempt to use any repair strategies during their course of picture description.

Hence from the study, it can be noted that the use of a complex discourse production task confirmed the need for a cognitively demanding task to augment subtle changes in communication in persons with dementia. The subtle changes can be better identified through comprehensive analysis of a spoken discourse that sufficiently triggers the cognitive system. Our results seem to support the use of complex generative discourse production task, to differentiate among the different levels of cognitive communicative impairment in relation to the cognitive deficits of adults with dementia.

Implication of the study

Distinguishing the limits of cognitive communicative abilities of adults with dementia in relation to their cognitive deficits using different discourse genre (conversation, narration and picture description task) is a challenge for clinicians and researchers. This complex discourse production distinguishes persons with dementia based on the difference in the rating obtained for the sub-parameters of propositional and non-propositional aspects of

discourse for conversation, narration and picture description. The method used in this study adds to the sensitivity of the technique, and to investigate the relationship between these levels of measures and the major neuropsychological processes which includes the executive function, episodic memory and semantic-pragmatic component of language used by adults with dementia. This information can provide answers to the questions on the importance of these abilities to spoken discourse production. Further studies should examine higher order abilities such as cognitive flexibility and planning to determine, if they are predictors of spoken discourse production which is only affected in adults with Dementia and spared in normal aging population. In addition to using traditional cognitive-linguistic assessments to further understand dementia, the qualitative measures of discourse under propositional and non-propositional level may also be used as a basis for developing new tests of language function for clinical use. These in turn help to improve diagnostic and prognostic accuracies. There is a need for clinical tools which can be administered more easily by psychologists and speech-language pathologists and which may in turn help to improve diagnostic and prognostic accuracies. Discourse analyses offer researchers an ability to examine the cognitive-linguistic aspects of expressive language as the output unfolds during a natural form of communication.

Utilization of the study

The results from the current study will help in understanding and comparing clinical performance of individuals with dementia on the three different discourse genres. The contributing factors are discussed and should be considered during clinical assessment and management of individuals with Dementia.

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APPENDIX- A

NIMH Socio-Economic Status Scale, Revised Version

(Venkateshan, 2011)

A.	Pooled Monthly Income		Score
	1.	Rs. 5000 or below	1
	2.	Rs. 5001 – Rs. 10000	2
	3.	Rs. 10001 – Rs. 15000	3
	4.	Rs. 15001 – Rs. 20000	4
	5.	Rs. 20001 & above	5
B.	Highest Education		Score
	1.	Illiterate	1
	2.	Primary/Secondary School	2
	3.	Matriculation	3
	4.	Graduation	4
	5.	Post Graduation & Above	5
C.	Occupation		Score
	1.	Unskilled labor/Unemployed/Daily Wager	1
	2.	Semi-skilled Worker/Class IV Service	2
	3.	Skilled/Technical/Class III Service	3
	4.	Professional/Class II Service/Blue Collared Jobs	4
	5.	Specialized/Class I Services/White Collared Jobs	5
D.	Family Properties (Immovable & Movable)		Score
	1.	Nil or Below Rs. 50000	1
	2.	Between Rs. 50000 to Rs. 1.5 Lakhs	2
	3.	Between Rs. 1.5 Lakhs to Rs. 2.5 Lakhs	3
	4.	Between Rs. 2.5 lakhs to Rs. 5.0 Lakhs	4
	5.	Above Rs. 5.0 Lakhs	5
	Total		

Note: Circle the appropriate score and enter sum into the cell against ‘Grand Total’;
 Interpretative Norms for Obtaining Overall SES: 0-4 is SES I; 5-8 is SES II; 9-12 is SES III;
 13-16 is SES IV; 17-20 is SES V.



**All India Institute of Speech and Hearing, Naimisham
Campus, Manasagangothri, Mysore – 570006.**

CONSENT FORM

Project on

Validation on Discourse Analysis Scale on Adults with Dementia.

Information to the participants

I, Ms. Akshaya S working as Research Officer for an ARF project titled-**“Validation on Discourse Analysis Scale on Adults with Dementia”** with the Principal Investigator Dr. Hema N., Lecturer, Dept. of Speech – Language Sciences, AIISH, Mysore – 6. The aim of the research is to validate the Discourse Analysis Scale for conversation, narration and picture description in individuals with Dementia. I need to collect data from 40 individuals above 20 years of age. Information will be collected through an interview and video recording for the duration of 30 minutes each. I assure you that this data will be kept confidential. There is no influence or pressure of any kind by us or the investigating institute to your participation and the research procedure is different from routine medical or therapeutic care activities. There is no risk involved to the participants but your cooperation in the study will go a long way in helping us in understanding discourse in individuals with Dementia and it will, thus assist in assessment and treatment of these individuals.

Informed Consent

I have been informed about the aims, objectives and the procedure of the study. I understand that I have a right to refuse participation as participant or withdraw my consent at any time.

I, _____, the undersigned, give my consent to be participant of this investigation/study/program.

Signature of participant

(Name and Address)

Signature of investigator

Date

APPENDIX- C

General Health Questionnaire-12

(Golderberg &Williams, 1988)

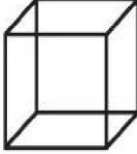
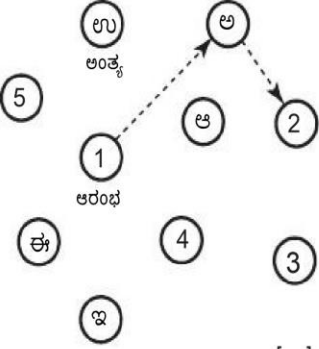
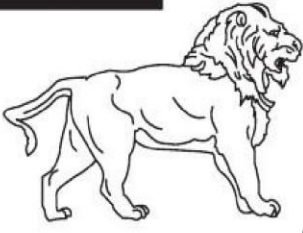
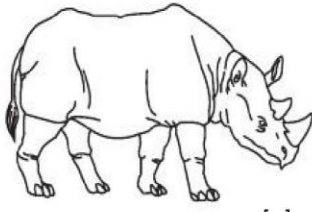
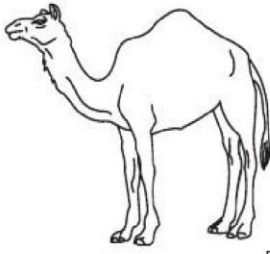
7. been able to concentrate on whatever you're doing?	Better than usual	Same as usual	Worse than usual	Much worse than usual
14. Lost much sleep over worry?	Not at all	No more than usual	Rather more than usual	Much more than usual
35. Felt that you are playing a useful part in things?	More so than usual	Same as usual	Less useful than usual	Much less useful
36. Felt capable of making decisions about things	More so than usual	Same as usual	Less useful than usual	Much less useful
39. Felt constantly under strain?	Not at all	No more than usual	Rather more than usual	Much more than usual
40. Felt you couldn't overcome your difficulties?	Not at all	No more than usual	Rather more than usual	Much more than usual
42. been able to enjoy your normal day-to-day activities?	More so than usual	Same as usual	Less useful than usual	Much less useful
46. been able to face up to your problems?	More so than usual	Same as usual	Less useful than usual	Much less useful
49. Been feeling unhappy and depressed?	Not at all	No more than usual	Rather more than usual	Much more than usual
50. Been losing confidence in yourself?	Not at all	No more than usual	Rather more than usual	Much more than usual
51. Been thinking of yourself as a worthless person?	Not at all	No more than usual	Rather more than usual	Much more than usual
54. Been feeling reasonably happy, all things considered?	More so than usual	Same as usual	Less useful than usual	Much less useful

APPENDIX- D

MONTREAL COGNITIVE ASSESSMENT (MOCA)
Version 7.1 Kannada Version

NAME:
Education:
Sex:

Date of birth:
DATE:

VISUOSPATIAL / EXECUTIVE				ಕ್ಯೂಬ್ ನಕಲು ಮಾಡಿ	ಗಡಿಯಾರ ಚಿತ್ರಿಸಿ (ಹನ್ನೊಂದು ಗಂಟೆ ಹತ್ತು ನಿಮಿಷ) (3 Points)	POINTS			
	[]	[]	[]	[]	[]	___/5			
NAMING									
	[]		[]		[]	___/3			
MEMORY		ಪದಗಳನ್ನು ಓದಿ. ಪ್ರಯೋಗಾರ್ಥಿ		ಕಬ್ಬು	ಸೀರೆ	ದೇವಸ್ಥಾನ	ಗುಲಾಬಿ	ನೀಲಿ	No points
ಪದಗಳನ್ನು ಪುನರಾವರ್ತಿಸಬೇಕು. ಎಲ್ಲ ಪದಗಳನ್ನು ಹೇಳಿದರು ಕೂಡ ಎರಡನೇ ಬಾರಿ ಪದಗಳನ್ನು ಹೇಳಿ.5 ನಿಮಿಷ ಬಿಟ್ಟು ಮತ್ತೆ ಕೇಳಿ.		1 ಪ್ರಯೋಗ	2 ಪ್ರಯೋಗ						
ATTENTION		ಪಟ್ಟಿಯಲ್ಲಿರುವ ಸಂಖ್ಯೆಗಳನ್ನು ಓದಿ (1 Digit/sec)		ವ್ಯಕ್ತಿಯ ಸಂಖ್ಯೆಗಳನ್ನು ನೆನಪಿಸಿಕೊಂಡು ಮುಂದಕ್ಕೆ ಹೇಳಬೇಕು		[] 2 1 8 5 4			___/2
				ವ್ಯಕ್ತಿಯ ಸಂಖ್ಯೆಗಳನ್ನು ಉಲ್ಲಾಸ ಕ್ರಮದಲ್ಲಿ ಹೇಳಬೇಕು		[] 7 4 2			
		ಪಟ್ಟಿಯಲ್ಲಿರುವ ಅಕ್ಷರಗಳನ್ನು ಓದಿ. ವ್ಯಕ್ತಿಯು ಅ ಅಕ್ಷರ ಬಂದಾಗ ತನ್ನ ಕೈ ತಟ್ಟಬೇಕು.						No points if ≥ 2 errors	
								[] ಫ, ಬ, ಅ, ಸ, ಮ, ನ, ಅ, ಅ, ಜ, ಕ ಲ, ಬ, ಅ, ಫ, ಅ, ಕ, ಡ, ಈ, ಅ, ಅ, ಅ, ಜ, ಅ ಮ, ಬ, ಫ, ಅ, ಅ, ಅ, ಬ	
		100 ರಿಂದ ಶುರು ಮಾಡಿ 7ನ್ನು ಕಳಿಸಿಕೊಂಡು ಹೋಗಿ.		[] 93	[] 86	[] 79	[] 72	[] 65	___/3
								4 or 5 correct subtractions: 3pts , 2 or 3 correct: 2pts , 1 correct: 1 pt , 0 correct: 0 pt	
LANGUAGE		ಪುನರಾವರ್ತಿಸಿ: ನನಗೆ ಗೊತ್ತು ಈ ದಿನ ನನಗೆ ಸಹಾಯ ಮಾಡುವವನು ರಾಮು ಮಾತ್ರ []						___/2	
		ಕೊಣೆಯಲ್ಲಿ ನಾಯಿ ಬಂದರೆ ಬಿಟ್ಟು ಯಾವಾಗಲೂ ಮಂಜದ ಕೆಳಗೆ ಬಿಟ್ಟುಕೊಟ್ಟುತಡೆ []						___/1	
		ಪ ಅಕ್ಷರದಿಂದ ಶುರುವಾಗುವ ಪದಗಳನ್ನು ಹೇಳಬೇಕು. ಎಷ್ಟು ಪದಗಳು ಸಾಧ್ಯೋ ಅಷ್ಟು ಹೇಳಬೇಕು [] _____ (N ≥ 11 words)						___/1	
ABSTRACTION		ನಡುವಿನ ಸಮಾನತೆ ಉದಾಹರಣೆ: ಬಾಳೆಹಣ್ಣು - ಕಿತ್ತೆಹಣ್ಣು = ಹಣ್ಣು [] ಟೈನ್ ಸೈಕಲ್ [] ಪ್ರಶ್ನೆ - ಸ್ವೇಲ್ ಸೈಗಡಿಯಾರ						___/2	
DELAYED RECALL		ಸುಳಿವು ಇಲ್ಲದೆ	ಕಬ್ಬು []	ಸೀರೆ []	ದೇವಸ್ಥಾನ []	ಗುಲಾಬಿ []	ನೀಲಿ []	Points for UNCUED recall only	
Optional		Category Cue						___/5	
		Multiple Choice Cue						___/5	
ORIENTATION		[] ದಿನಾಂಕ	[] ತಿಂಗಳು	[] ವರ್ಷ	[] ದಿನ	[] ಸ್ಥಳ	[] ಊರು	___/6	
TOTAL								___/30	

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www.mocatest.org

Normal ≥ 26 / 30

TOTAL

Add 1 point if ≤ 12 yr edu

Administered by: _____

Discourse Analysis Scale for conversation task

(Hema & Shyamala, 2008)

Points to be considered while using Discourse Analysis Scale:

The parameters of propositional and non-propositional aspects of conversation are quantified with few general instructions to the evaluator as follows:

1. Initially read the keys provided in the sub headings which explain the exact meaning of the parameters to be scored as good, fair and poor with respect to the particular context of conversation.
2. Scoring procedure involves the use of rating scale. Three points perceptual rating scale is used to evaluate each parameters.
3. Each appropriate behavior (*normal*) is given a *higher score* and the inappropriate behavior (*abnormal*) is scored *low*.

Propositional aspects of communication.

This includes the notion of relevancy, clarity of reference and coherence of information. It deals with how discourse is organized with respect to overall plan, theme or topic and how individual utterances are conceptually linked to main theme/topic.

1) Discourse Structure

Good- The discourse is organized with respect to overall plan, theme or topic and how individual utterances are conceptually linked to maintain unity.

Fair- The discourse is partially confusing even if it's organized with respect to overall plan, theme or topic and how individual utterances are conceptually linked to main theme/topic.

Poor- The discourse is completely confusing since it is unorganized with respect to overall plan, theme or topic and how individual utterances are conceptually linked to each other.

- a) Discourse forethought-----→ ()
 [Score: 0-Poor, 1-Fair, 2-Good]
- b) Organizational planning -----→ ()
 [Score: 0-Poor, 1-Fair, 2-Good]

2) Communication intent

This parameter can be evaluated using frequency count, so check for the presence or absence. If present, make a note whether an individual uses this parameter only in required circumstances or in all the circumstances.

Good- Individuals using this parameter in all required circumstances.

Fair- Individuals using this parameter inconsistently in the required circumstances.

Poor- This parameter is absent in the entire context of conversation.

- a) Greets others and introduces self:
 -By themselves-----→ ()
 [Score: 0-Poor, 1-Fair, 2-Good]

- In response to other's greeting-----→ ()
[Score: 0-Poor, 1-Fair, 2-Good]
- b) Starts a conversation-----→ ()
[Score: 0-Poor, 1-Fair, 2-Good]
- c) Asks information-----→ ()
[Score: 0-Poor, 1-Fair, 2-Good]
- d) Asks for assistance in understanding conversation-----→ ()
[Score: 0-Poor, 1-Fair, 2-Good]
- e) Criticizes the conversation by agreeing or disagreeing to a part in the conversation----
-----→ ()
[Score: 0-Poor, 1-Fair, 2-Good]
- f) Imagines events correctly-----→ ()
[Score: 0-Poor, 1-Fair, 2-Good]
- g) Understands advancers and blockers in the conversation-----→ ()
[Score: 0-Poor, 1-Fair, 2-Good]

3) Coherence

- a. Global coherence-----→ ()
Good- Presence of good relationship between the meaning and context of verbalization with respect to the general topic of conversation.
Fair- Presence of partial relationship between the meaning and context of verbalization with respect to the general topic of conversation.
Poor- Relationship between the meaning and context of verbalization with respect to the general topic of conversation is completely absent.
[Score: 0-Poor, 1-Fair, 2-Good]
- b. Local coherence-----→ ()
Good- Presence of good relationship between the meaning and context of verbalization with that of the immediately preceding utterance produced either by interviewer or participant.
Fair- Presence of partial relationship between the meaning and context of verbalization with that of the immediately preceding utterance produced either by interviewer or participant.
Poor- Relationship between the meaning and context of verbalization with that of the immediately preceding utterance produced either by interviewer or participant is completely absent.
[Score: 0-Poor, 1-Fair, 2-Good]

4) Topic management

- a) Introducing topic-----→ ()
Good- Correctly introducing the topic.
Fair- Partial but correct introduction to topic.
Poor- Irrelevantly introducing topic or no response.
[Score: 0-Poor, 1-Fair, 2-Good]
- b) Topic shift-----→ ()
Good- Staying within the given topic.

Fair- Gradual shift from the given topic.

Poor- Rapid shift from the given topic.

[Score: 0-Poor, 1-Fair, 2-Good]

c) Topic changes-----→ ()

Good- Coherent topic change where the topic is within the context of verbalization.

Fair- Partially inappropriate topic change but still the topic is within the main context of verbalization.

Poor- Non coherent topic change is present.

[Score: 0-Poor, 1-Fair, 2-Good]

d) Perseveration in the topics-----→ ()

Good- Perseveration not present.

Fair- Perseveration partially present.

Poor- Perseveration continuously present.

[Score: 0-Poor, 1-Fair, 2-Good]

e) Responses which expand topics-----→ ()

Good- Responses which expand topics is consistently present.

Fair- Responses which expand topics is partially present.

Poor- Responses which expand topics is absent.

[Score: 0-Poor, 1-Fair, 2-Good]

f) Minimal responses (Giving only Yes/No responses)-----→ ()

Good- Minimal use of yes/no response.

Fair- Yes/no responses partially present.

Poor- Only yes/no responses present.

[Score: 0-Poor, 1-Fair, 2-Good]

g) Minimal elaboration-----→ ()

In presence of prompts from the investigator, the participants attempting to give yes/no responses along with very few sentential level discourse to elaborate the topic.

Good- Minimal elaboration appropriately present in all required circumstances

Fair- Minimal elaboration partially present in all required circumstances.

Poor- Minimal elaboration absent in required circumstances or minimal elaboration only present throughout the context of conversation.

[Score: 0-Poor, 1-Fair, 2-Good]

h) Elaboration of topics-----→ ()

Good- Adequate elaboration of topic.

Fair- Partial elaboration of topic.

Poor- Extra elaboration of topic.

[Score: 0-Poor, 1-Fair, 2-Good]

5) Information adequacy

Good- Answers to all the questions during conversation at word level/ single sentence level/ multiple sentence level.

Fair- Answer to few questions during conversation at word level/ single sentence level/ multiple sentence level.

Poor- No answers / response to any of the questions during conversation.

- a. Word level/ Single sentence level/ Multiple sentence level-----→()
Underline the level at which the participant is positioned.
[Score: 0-Poor, 1-Fair, 2-Good]

6) Information content

Good- Meaningful and adequate information to all the questions in terms of initiating and/or sustaining conversation.

Fair- Meaningful and adequate information to only few question in terms of initiating and/or sustaining conversation or if you know what the person is talking about, even if the information doesn't appear to be available.

Poor- Nonmeaningful and inadequate information to all the questions in terms of initiating and or/sustaining conversation.

- a. Meaningful and adequate information-----→()
[Score: 0-Poor, 1-Fair, 2-Good]

7) Message Accuracy -----→()

Good- An attempted communication involving correct answers to the question without any confabulation or any inaccurate information within the same question frame.

Fair- An attempted communication involving correct answers to the question and few accurate information without any confabulation within the same question frame.

Poor- An attempted communication involving incorrect answers to the question with confabulation within the same question frame with all inaccurate information.

[Score: 0-Poor, 1-Fair, 2-Good]

8) Vocabulary specificity-----→ ()

Good- Using specific vocabulary when specific information is required.

Fair- Partially using specific vocabulary when specific information is required.

Poor- Overuse of generic terms such as "thing" and "stuff" when more specific information is required.

[Score: 0-Poor, 1-Fair, 2-Good]

9) Linguistic fluency -----→ ()

Good- Fluent discourse without any repetition, unusual pauses or hesitations.

Fair- Partially fluent discourse with very few repetitions, unusual pauses or hesitations.

Poor- Presence of repetition, unusual pauses, hesitations

[Score: 0-Poor, 1-Fair, 2-Good]

10) Speech Style -----→ ()

Good- Appropriate use of any dialectal structural forms, code switching and style-shifting.

Fair- Inappropriate use of dialectal structural forms, code switching, style-shifting is partially present.

Poor- Presence of totally inappropriate dialectal structural forms, code switching, style-shifting.

[Score: 0-Poor, 1-Fair, 2-Good]

11) Intonation -----→ ()

Good- Absence of any inappropriate or abnormal rising, falling, flat intonation with respect to a particular context of conversation.

Fair- Inappropriate or abnormal rising, falling, flat intonation with respect to a particular context of conversation is partially present.

Poor- Presence of inappropriate or abnormal rising, falling, flat intonation with respect to a particular context of conversation.

[Score: 0-Poor, 1-Fair, 2-Good]

12) Gaze Efficiency -----→ ()

Good- Consistent use of appropriate eye gaze to the conversational context.

Fair- Partially consistent eye gaze to the conversational context.

Poor- Not appropriate or restricted eye gaze to the conversational context.

[Score: 0-Poor, 1-Fair, 2-Good]

13) Response time-----→ ()

Time taken to respond to any questions during the conversation which is measured in terms of seconds.

Good- Response at 0.5-2sec.

Fair- Response at 3-5 sec.

Poor- Response delayed beyond 6-8 sec.

[Score: 0-Poor, 1-Fair, 2-Good]

Non propositional or Interactional aspects of communication

This is one of the important categories of social communication behavior. These behaviors reflect the reciprocal nature of conversation and the joint co-operation required of the participant.

The following subcategories are considered:

1) Turn taking

a) Initiation of turn-----→ ()

Good- Present at required circumstances of the entire conversation.

Fair- Present at half of the required circumstances of the entire conversation.

Poor- No initiation of turn taking in any circumstances of the entire conversation.

[Score: 0-Poor, 1-Fair, 2-Good]

b) Time to start a turn-----→ ()

Good- Not taking time to start a turn.

Fair- Partially taking time to start a turn.

Poor- Completely taking time to start a turn.

[Score: 0-Poor, 1-Fair, 2-Good]

c) Contingency of the turn -----→ ()

Good- Presence of contingent turns where it fulfills the semantic or informational expectation of the previous turn, but shares the same topic.

Fair- Partially non- contingent turns are present where it does not fulfill the semantic or informational expectation of the previous turn, but shares the same topic. This also includes "don't know," "yes," and "no" responses *when used to avoid* maintaining a topic, and echolalia.

Poor- Non-contingent turns present.

[Score: 0-Poor, 1-Fair, 2-Good]

d) Unable to take prosodic cues -----→ ()

Good- Able to take the prosodic cues in the entire conversational context for the purpose of turn taking.

Fair- Partially able to take the prosodic cues in some conversational contexts for the purpose of turn taking.

Poor- Unable to take the prosodic cues in the entire conversational context for the purpose of turn taking.

[Score: 0-Poor, 1-Fair, 2-Good]

e) Mode of conversation -----→ ()

Good- Using appropriate verbal or non verbal mode without any abrupt/rapid shift from verbal and non verbal mode during turn taking.

Fair- Partially using appropriate verbal or non verbal mode with abrupt/rapid shift between verbal and non verbal mode during turn taking.

Poor- Not using appropriate verbal or non verbal mode with rapid shift between verbal and non verbal mode during turn taking at all.

[Score: 0-Poor, 1-Fair, 2-Good]

f) Listeners or speakers mode-----→ ()

Good- Appropriate change from speaker to listener mode or listener to speaker mode with reference to the entire context of conversation.

Fair- Partially appropriate change from speaker to listener mode or listener to speaker mode with reference to some contexts of conversation.

Poor- Inappropriately persistent in speaker or listener mode with reference to the entire context of conversation.

[Score: 0-Poor, 1-Fair, 2-Good]

2) **Revision behaviors** -----→ ()

Good- Absence of false starts and self interruptions in the entire context of conversation.

Fair- Presence of false starts and self interruptions in some contexts of conversation.

Poor- Continuous presence of false starts and self-interruptions in the entire context of conversation.

[Score: 0-Poor, 1-Fair, 2-Good]

3) **Conversation repair**

This parameter can be evaluated using frequency count, so check for the presence or absence. If present, make a note whether an individual use this parameter only in required circumstances or in all the circumstances.

Good- Individuals using this parameter in all required circumstances.

Fair- Individuals using this parameter inconsistently in the required circumstances.

Poor- Individuals not using this parameter at all in the entire context of conversation.

- a) Use of self repair through repetition-----→ ()
Repeating themselves and correcting the discourse without the investigators help.
[Score: 0-Poor, 1-Fair, 2-Good]
- b) Use of revisions through clarification-----→ ()
Requesting the investigator to modify the discourse and use the corrected version of discourse to continue the topic of conversation.
[Score: 0-Poor, 1-Fair, 2-Good]
- c) Use of other initiated repair -----→ ()
Participants not able to find the right word, so the investigator fills it with the correct word to continue the topic of conversation.
[Score: 0-Poor, 1-Fair, 2-Good]

Finally, one can find discourse quotient, using the total score on propositional and non-propositional aspects of communication which should be divided by total scores of all the features of propositional and non-propositional aspects of communication. This must be multiplied with hundred to get the score in percentage.

Example: The participant's score is 54

Discourse Quotient = $54/58+20= 54/78 \times 100= 69.23$

Discourse Analysis Scale for narration task

(Hema & Shyamala, 2008)

Points to be considered while using Discourse Analysis Scale:

The parameters of propositional and non-propositional aspect of narration can be quantified with few general instructions to the evaluator as follows:

1. Initially read the keys provided in the sub headings which explain the exact meaning of the parameters to be scored as good, fair and poor with respect to the particular context of narration.
2. Scoring procedure involves the use of rating scale. Three points perceptual rating scale is used to evaluate each parameters.
3. Each appropriate behavior (*normal*) is given a *higher score* and the inappropriate behavior (*abnormal*) is scored *low*.

Propositional aspects of communication.

This includes the notion of relevancy, clarity of reference and coherence of information. It deals with how discourse is organized with respect to overall plan, theme or topic and how individual utterances are conceptually linked to main theme/topic.

1) Discourse Structure

Good- The discourse is organized with respect to overall plan, theme or topic and how events occurring earlier in time being described before events occurring later, and causative events preceding their consequences. The narrative discourse is never confusing in terms of logically and chronologically.

Fair- The discourse is partially confusing even if it's partially organized with respect to overall plan, theme or topic and how events occurring earlier in time being described before events occurring later, and causative events preceding their consequences, logically and chronologically making the narratives confusing.

Poor- The discourse is completely confusing since it is unorganized with respect to overall plan, theme or topic and how events occurring earlier in time being described before events occurring later, and causative events preceding their consequences. Thus the narrative is completely confusing in terms of logically and chronologically.

a) Discourse forethought-----→()
 [Score: 0-Poor, 1-Fair, 2-Good]

b) Organizational planning -----→()
 [Score: 0-Poor, 1-Fair, 2-Good]

2) Communication intent

This parameter can be evaluated using frequency count, so check for the presence or absence. If present, make a note whether an individual use this parameter only in required circumstances or in all the circumstances.

Good- Individuals using this parameter in all required circumstances.

Fair- Individuals using this parameter inconsistently in the required circumstances.

Poor- This parameter is absent in the entire context of narration.

- a) Initiation of narration-----→()
[Score: 0-Poor, 1-Fair, 2-Good]
- b) Asks for assistance during narration-----→()
[Score: 0-Poor, 1-Fair, 2-Good]
- c) Imagines events correctly-----→()
[Score: 0-Poor, 1-Fair, 2-Good]

3) Coherence

- a). Global coherence-----→()

Good- Presence of good relationship between the meaning and context of verbalization with respect to the general topic of narration.

Fair- Presence of partial relationship between the meaning and context of verbalization with respect to the general topic of narration.

Poor- Relationship between the meaning and context of verbalization with respect to the general topic of narration is completely absent.

[Score: 0-Poor, 1-Fair, 2-Good]

- b). Local coherence-----→()

Good- Presence of good relationship between the meaning and context of verbalization with that of the immediately preceding utterance produced by the participant.

Fair- Presence of partial relationship between the meaning and context of verbalization with that of the immediately preceding utterance produced by the participant.

Poor- Relationship between the meaning and context of verbalization with that of the immediately preceding utterance produced by the participant is completely absent.

[Score: 0-Poor, 1-Fair, 2-Good]

4) Topic management

- a). Introducing topic-----→()

Good- Correctly introducing the topic.

Fair- Partial but correct introduction to topic.

Poor- Irrelevantly introducing topic or no response.

[Score: 0-Poor, 1-Fair, 2-Good]

- b) Topic shift-----→()

Good- Staying within the given topic.

Fair- Gradual shift from the given topic.

Poor- Rapid shift from the given topic.

[Score: 0-Poor, 1-Fair, 2-Good]

- c) Topic changes-----→()
Good- Coherent topic change where the topic is within the context of verbalization in terms of when and where the narrating event occurred.
Fair- Partially inappropriate topic change but still the topic is within the main context of verbalization in terms of when and where the narrating event occurred.
Poor- Non coherent topic change where the topic is decontextualized.
[Score: 0-Poor, 1-Fair, 2-Good]
- d) Perseveration in the topics-----→()
Good- Perseveration not present.
Fair- Perseveration partially present.
Poor- Perseveration continuously present.
[Score: 0-Poor, 1-Fair, 2-Good]
- e) Minimal elaboration-----→()
In presence of prompts from the investigator, the participants attempting to give yes/no responses along with very few sentential level discourse to elaborate the topic.
Good- Minimal elaboration appropriately present in all required circumstances
Fair- Minimal elaboration partially present in all required circumstances.
Poor- Minimal elaboration absent in required circumstances or minimal elaboration only present throughout the context of narration.
[Score: 0-Poor, 1-Fair, 2-Good]
- f) Elaboration of topics-----→()
Good- Adequate elaboration of topic.
Fair- Partial elaboration of topic.
Poor- Extra elaboration of topic.
[Score: 0-Poor, 1-Fair, 2-Good]

5) Information adequacy

Good- Completely adequate narration at word level/ single sentence level/ multiple sentence level without any prompts from the investigator.
Fair- Partially adequate narration at word level/ single sentence level/ multiple sentence level in the presence of few prompts from the investigator.
Poor- No narration at word level/ single sentence level/ multiple sentence level despite several prompts from the investigator.

- a). Word level/ Single sentence level/ Multiple sentence level-----→()
Underline the level at which the participant is positioned.
[Score: 0-Poor, 1-Fair, 2-Good]

6) Information content

Good- Completely correct description of people, locations, objects, activities and attributes that played a role in the events being narrated about. Good narratives pointing a detailed linguistic picture of the events they are describing.
Fair- Partially correct description of people, locations, objects, activities and attributes that played a role in the events being narrated about; Good narratives pointing more than half a linguistic picture of the events they are describing.

Poor- Incorrect description of people, locations, objects, activities and attributes that played a role in the events being narrated about. Good narratives pointing less than half a linguistic picture of the events they are describing.

- a). Meaningful and adequate information-----→()
[Score: 0-Poor, 1-Fair, 2-Good]

7) Message Accuracy -----→()

Good- An attempted narration involving correct narration without any confabulation or any inaccurate information within the same context of narration.

Fair- An attempted narration involving correct narration and few accurate information without any confabulation within the same context of narration.

Poor- An attempted narration involving incorrect narration with confabulation within the same context of narration with all inaccurate information.

[Score: 0-Poor, 1-Fair, 2-Good]

8) Temporal and causal relation (TCR)-----→()

Good- Presence of all the temporal terms like then, and then, first, next, before, and after; causal terms like because, when, if, while, and until.

Fair- Presence of few temporal terms like then, and then, first, next, before, and after; causal terms like because, when, if, while, and until.

Poor- Absence of all the temporal terms like then, and then, first, next, before, and after; causal terms like because, when, if, while, and until.

[Score: 0-Poor, 1-Fair, 2-Good]

9) Vocabulary specificity-----→()

Good- Using specific vocabulary when specific information is required.

Fair- Partially using specific vocabulary when specific information is required.

Poor- Overuse of generic terms such as "thing" and "stuff" when more specific information is required.

[Score: 0-Poor, 1-Fair, 2-Good]

10) Linguistic fluency -----→()

Good- Fluent discourse without any repetition, unusual pauses or hesitations.

Fair- Partially fluent discourse with very few repetitions, unusual pauses or hesitations.

Poor- Presence of repetition, unusual pauses, hesitations

[Score: 0-Poor, 1-Fair, 2-Good]

11) Speech Style -----→()

Good- Appropriate use of any dialectal structural forms, code switching and style-shifting.

Fair- Inappropriate use of dialectal structural forms, code switching, style-shifting is partially present.

Poor- Presence of totally inappropriate dialectal structural forms, code switching, style-shifting.

[Score: 0-Poor, 1-Fair, 2-Good]

12) Intonation -----→()

Good- Absence of any inappropriate or abnormal rising, falling, flat intonation with respect to a particular context of narration.

Fair- Inappropriate or abnormal rising, falling, flat intonation with respect to a particular context of narration is partially present.

Poor- Presence of inappropriate or abnormal rising, falling, flat intonation with respect to a particular context of narration.

[Score: 0-Poor, 1-Fair, 2-Good]

Non propositional or Interactional aspects of communication

This is one of the important categories of social communication behavior. These behaviors reflect the reciprocal nature of conversation and the joint co-operation required of the participant. *(Note: In narration it is only from participants' point of view)*

The following subcategories are considered:

1) Revision behaviors -----→()

Good- Absence of false starts and self interruptions in the entire context of narration.

Fair- Presence of false starts and self interruptions in some contexts of narration.

Poor- Continuous presence of false starts and self-interruptions in the entire context of narration.

[Score: 0-Poor, 1-Fair, 2-Good]

2) Repair strategy

This parameter can be evaluated using frequency count, so check for the presence or absence. If present, make a note whether an individual use this parameter only in required circumstances or in all the circumstances.

Good- Individuals using this parameter in all required circumstances.

Fair- Individuals using this parameter inconsistently in the required circumstances.

Poor- Individuals not using this parameter at all in the entire context of narration.

a) Use of self correction -----→()

Participants find a word or sentence after giving a small pause and continue the topic of narration.

[Score: 0-Poor, 1-Fair, 2-Good]

b) Use of repair through repetition/revision-----→()

Repeating themselves and correcting the discourse without the investigators help.

[Score: 0-Poor, 1-Fair, 2-Good]

c) Use of other initiated correction-----→()

Participants not able to find the right word, so the investigator fills it with the correct word to continue the topic of narration.

[Score: 0-Poor, 1-Fair, 2-Good]

d) Use of request for clarification -----→()

Requesting the investigator to modify the discourse and use the corrected version of discourse to continue the topic of narration.

[Score: 0-Poor, 1-Fair, 2-Good]

Finally, one can find discourse quotient, using the total score on propositional and non propositional aspects of communication which should be divided by total scores of all the features of propositional and non propositional aspects of communication. This must be multiplied with hundred to get the score in percentage. *Example:* The participant's score is 32.

Discourse Quotient = $32/44+10= 32/54 \times 100= 59.25$

Discourse Analysis Scale for picture description task
(Hema & Shyamala, 2008)

Points to be considered while using Discourse Analysis Scale:

The parameters of propositional and non-propositional aspect of picture description can be quantified with few general instructions to the evaluator as follows:

1. Initially read the keys provided in the sub headings which explain the exact meaning of the parameters to be scored as good, fair and poor with respect to the particular context of conversation.
2. Scoring procedure involves the use of rating scale. Three points perceptual rating scale is used to evaluate each parameters.
3. Each appropriate behavior (*normal*) is given a *higher score* and the inappropriate behavior (*abnormal*) is scored *low*.

Propositional aspects of communication.

This includes the notion of relevancy, clarity of reference and coherence of information. It deals with how discourse is organized with respect to overall plan, theme or topic and how individual utterances are conceptually linked to main theme/topic.

1) Discourse Structure

Good- The discourse is organized with respect to overall plan, theme or topic and how individual utterances are conceptually linked to maintain unity.

Fair- The discourse is partially confusing even if it is partially organized with respect to overall plan, theme or topic and how individual utterances are conceptually linked to main theme/topic.

Poor- The discourse is completely confusing since it is unorganized with respect to overall plan, theme or topic and how individual utterances are conceptually linked to each other.

a) Discourse forethought-----→ ()
[Score: 0-Poor, 1-Fair, 2-Good]

b) Organizational planning -----→ ()
[Score: 0-Poor, 1-Fair, 2-Good]

2) Communication intent

This parameter can be evaluated using frequency count, so check for the presence or absence. If present, make a note whether an individual use this parameter only in required circumstances or in all the circumstances.

Good- Individuals using this parameter in all required circumstances.

Fair- Individuals using this parameter inconsistently in the required circumstances.

Poor- This parameter is absent in the entire context of picture description.

a). Initiation of picture description-----→()

- [Score: 0-Poor, 1-Fair, 2-Good]
- b). Asks for assistance in understanding picture-----→()
- [Score: 0-Poor, 1-Fair, 2-Good]
- c). Criticizes the picture by agreeing/disagreeing to a part in the picture→()
- [Score: 0-Poor, 1-Fair, 2-Good]
- d) Imagines events correctly-----→()
- [Score: 0-Poor, 1-Fair, 2-Good]

3) Coherence

- a. Global coherence-----→()
- Good-** Presence of good relationship between the meaning and context of verbalization with respect to the general topic of picture description.
- Fair-** Presence of partial relationship between the meaning and context of verbalization with respect to the general topic of picture description.
- Poor-** Relationship between the meaning and context of verbalization with respect to the general topic of picture description is completely absent.
- [Score: 0-Poor, 1-Fair, 2-Good]
- b. Local coherence-----→()
- Good-** Presence of good relationship between the meaning and context of verbalization with that of the immediately preceding utterance produced by the participant.
- Fair-** Presence of partial relationship between the meaning and context of verbalization with that of the immediately preceding utterance produced by the participant.
- Poor-** Relationship between the meaning and context of verbalization with that of the immediately preceding utterance produced by the participant is completely absent.
- [Score: 0-Poor, 1-Fair, 2-Good]

4) Topic management

- a). Introducing topic-----→()
- Good-** Correctly introducing the topic.
- Fair-** Partial but correct introduction to topic.
- Poor-** Irrelevantly introducing topic or no response.
- [Score: 0-Poor, 1-Fair, 2-Good]
- b). Topic shift-----→()
- Good-** Staying within the given topic.
- Fair-** Gradual shift from the given topic.
- Poor-** Rapid shift from the given topic.
- [Score: 0-Poor, 1-Fair, 2-Good]
- c). Topic changes-----→()
- Good-** Coherent topic change where the topic is within the context of verbalization.
- Fair-** Partially inappropriate topic change but still the topic is within the main context of verbalization.

Poor- Non coherent topic change is present.

[Score: 0-Poor, 1-Fair, 2-Good]

d) Perseveration in the topics-----→ ()

Good- Perseveration not present.

Fair- Perseveration partially present.

Poor- Perseveration continuously present.

[Score: 0-Poor, 1-Fair, 2-Good]

e). Minimal elaboration-----→ ()

In presence of prompts from the investigator, the participants attempting to give yes/no responses along with very few sentential level discourse to elaborate the topic.

Good- Minimal elaboration appropriately present in all required circumstances

Fair- Minimal elaboration partially present in all required circumstances.

Poor- Minimal elaboration absent in required circumstances or minimal elaboration only present throughout the context of picture description.

[Score: 0-Poor, 1-Fair, 2-Good]

f). Elaboration of topics-----→ ()

Good- Adequate elaboration of topic.

Fair- Partial elaboration of topic.

Poor- Extra elaboration of topic.

[Score: 0-Poor, 1-Fair, 2-Good]

5) Information adequacy

Good- Completely adequate picture description at word level/ single sentence level/ multiple sentence level without any prompts from the investigator.

Fair- Partially adequate picture description at word level/ single sentence level/ multiple sentence level in the presence of few prompts from the investigator.

Poor- No picture description at word level/ single sentence level/ multiple sentence level despite several prompts from the investigator.

a) Word level/ Single sentence level/ Multiple sentence level-----→()

Underline the level at which the participant is positioned.

[Score: 0-Poor, 1-Fair, 2-Good]

6) Information content

Good- Meaningful and adequate information of the picture description in terms of initiating and/or sustaining the task.

Fair- Meaningful and adequate information of the picture description in terms of initiating and/or sustaining the task or if you know what the person is talking about, even if the information doesn't appear to be available or more than half of the picture described.

Poor- Nonmeaningful and inadequate information of the picture description in terms of initiating and or/sustaining the task or less than half of the picture described.

a. Meaningful and adequate information-----→ ()

[Score: 0-Poor, 1-Fair, 2-Good]

- 7) **Message Accuracy** -----→()
Good- An attempted picture description involving correct descriptions of picture without any confabulation or any inaccurate information within the same context of picture description.
Fair- An attempted picture description involving correct description of picture and few accurate information without any confabulation within the same context of picture description.
Poor- An attempted picture description involving incorrect descriptions of picture with confabulation within the same context of picture description with all inaccurate information.
[Score: 0-Poor, 1-Fair, 2-Good]
- 8) **Vocabulary specificity**-----→ ()
Good- Using specific vocabulary when specific information is required.
Fair- Partially using specific vocabulary when specific information is required.
Poor- Overuse of generic terms such as "thing" and "stuff" when more specific information is required.
[Score: 0-Poor, 1-Fair, 2-Good]
- 9) **Linguistic fluency** -----→ ()
Good- Fluent discourse without any repetition, unusual pauses or hesitations.
Fair- Partially fluent discourse with very few repetitions, unusual pauses or hesitations.
Poor- Presence of repetition, unusual pauses, hesitations
[Score: 0-Poor, 1-Fair, 2-Good]
- 10) **Speech Style** -----→ ()
Good- Appropriate use of any dialectal structural forms, code switching and style-shifting.
Fair- Inappropriate use of dialectal structural forms, code switching, style-shifting is partially present.
Poor- Presence of totally inappropriate dialectal structural forms, code switching, style-shifting.
[Score: 0-Poor, 1-Fair, 2-Good]
- 11) **Intonation** -----→ ()
Good- Absence of any inappropriate or abnormal rising, falling, flat intonation with respect to a particular context of picture description.
Fair- Inappropriate or abnormal rising, falling, flat intonation with respect to a particular context of picture description is partially present.
Poor- Presence of inappropriate or abnormal rising, falling, flat intonation with respect to a particular context of picture description.
[Score: 0-Poor, 1-Fair, 2-Good]
- 12) **Response time**-----→ ()
Time taken to start the picture description and is measured in terms of seconds.

Good- Response at 0.5-2sec.
Fair- Response at 3-5 sec.
Poor- Response delayed beyond 6-8 sec.
 [Score: 0-Poor, 1-Fair, 2-Good]

13) Gist of information -----→ ()

Good- Presence of correct depiction (picnic spot).
Fair- Partially correct depiction (picnic spot) with good local and poor global coherence.
Poor- Completely wrong depiction (picnic spot) with poor local and global coherence.
 [Score: 0-Poor, 1-Fair, 2-Good]

Non propositional or Interactional aspects of communication

This is one of the important categories of social communication behavior. These behaviors reflect the reciprocal nature of conversation and the joint co-operation required of the participant. *(Note: In picture description it is only from participants' point of view)*
 The following subcategories are considered:

1) Revision behaviors -----→ ()

Good- Absence of false starts and self interruptions in the entire context of picture description.
Fair- Presence of false starts and self interruptions in some contexts of picture description.
Poor- Continuous presence of false starts and self-interruptions in the entire context of picture description.
 [Score: 0-Poor, 1-Fair, 2-Good]

2) Repair strategy

This parameter can be evaluated using frequency count, so check for the presence or absence. If present, make a note whether an individual use this parameter only in required circumstances or in all the circumstances.

Good- Individuals using this parameter in all required circumstances.
Fair- Individuals using this parameter inconsistently in the required circumstances.
Poor- Individuals not using this parameter at all in the entire context of picture description.

a). Use of self correction -----→ ()

Participants find a word or sentence after giving a small pause and continue the topic of picture description.
 [Score: 0-Poor, 1-Fair, 2-Good]

b). Use of repair through repetition/revision-----→ ()

Repeating themselves and correcting the discourse without the investigators help.
 [Score: 0-Poor, 1-Fair, 2-Good]

c) Use of other initiated correction-----→ ()

Participants not able to find the right word, so the investigator fills it with the correct word to continue the topic of picture description.

[Score: 0-Poor, 1-Fair, 2-Good]

d) Use of request for clarification -----> ()

Requesting the investigator to modify the discourse and use the corrected version of discourse to continue the topic of picture description. [Score: 0-Poor, 1-Fair, 2-Good]

Picture card from Western Aphasia Battery, Shyamala and Ravikumar (2008) and edited to colored picture card



Finally, one can find discourse quotient, using the total score on propositional and non propositional aspects of communication which should be divided by total scores of all the features of propositional and non propositional aspects of picture description. This must be multiplied with hundred to get the score in percentage.

Example: The participant's score is 32

Discourse Quotient = $32/44+10= 32/54 \times 100= 59.25$

APPENDIX G– INDIVIDUAL SCORES OF 40 INDIVIDUALS WITH DEMENTIA – CONVERSATION DICOURSE

Conversation Discourse parameters	Individual scores of 40 Individuals with Mild Dementia Mean Proposition, Mean Non Proposition and Discourse Score - Conversation																																																
Discourse forethought	1	0	0	1	1	1	0	0	1	1	1	0	0	1	1	1	0	0	1	1	1	0	0	1	1	1	0	0	1	1	1	0	0	1	1	1	0	0	1										
Organizational Planning	0	1	1	0	1	0	1	1	0	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0						
Greeting and introduction	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						
Starts conversation	1	1	1	2	2	1	2	0	1	1	1	2	1	2	1	1	1	1	2	2	1	1	1	1	0	2	0	1	1	1	1	1	1	1	1	1	1	1	0	1	0	2							
Asks information	0	0	1	0	0	1	1	1	1	0	1	0	1	0	1	1	1	1	0	0	1	0	1	1	1	1	1	1	0	1	1	0	1	1	0	0	1	0	1	0	1	0	1						
Asks assistance	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	1	0	1	1	1	1	1	0	0	0	0	0	1	1	1	1	0	0	0	0	1	0	0	1	0	0	1						
Criticizing	1	1	0	1	0	1	0	1	0	0	0	0	1	2	0	1	0	0	0	0	1	1	1	1	0	1	0	0	0	0	1	1	1	1	1	0	1	0	1	0	1	0	1						
Imagination of events	0	1	1	0	0	1	1	1	0	0	1	0	1	1	1	1	1	0	0	0	1	0	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	1						
Understands blockers and advancers	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Global coherence	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	0	0	0	1	1	1	1					
Local Coherence	2	1	1	2	1	1	0	1	2	2	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1					
Introducing topic	1	2	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1				
Topic shifts	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1	1	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0			
Topic changes	1	0	0	1	1	0	0	1	1	1	1	0	1	1	0	1	0	0	1	0	1	0	1	1	1	0	1	0	1	1	1	1	1	1	1	1	0	0	0	0	1	0	1	0	1				
Perseverations	1	0	0	1	1	0	1	0	1	0	1	1	1	0	0	1	0	0	1	1	1	0	0	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	1			
Responses with expand topic	1	1	1	1	1	0	0	0	0	1	1	0	1	1	1	1	0	0	1	1	1	0	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	0			
Minimal responses	1	0	1	1	0	1	1	1	0	0	1	1	1	1	0	0	0	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Minimal elaborations	1	1	0	1	0	0	1	1	1	1	0	1	0	1	1	0	0	1	1	1	0	0	1	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Topic elaboration	0	1	1	0	1	0	0	0	1	0	0	1	0	1	0	0	0	1	0	1	0	0	0	1	0	1	0	1	0	1	1	1	1	1	1	1	0	1	0	1	0	1	0	1	0	1			
Information adequacy	1	0	1	0	0	1	1	0	0	0	1	0	1	0	0	1	1	1	1	1	0	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Information content	1	1	1	1	1	1	1	1	1	1	0	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Message accuracy	1	1	0	1	0	1	0	1	1	0	1	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	0	1	1	1	1	1	1	1	1	1	0	0	0		
Vocabulary specificity	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	
Linguistic fluency	0	0	1	0	0	1	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1
Speech style	1	0	1	1	0	1	0	0	1	1	1	0	0	1	1	0	0	1	0	0	1	1	1	0	1	0	1	0	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Intonation	1	1	1	1	0	1	1	0	1	1	0	1	1	0	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Gaze efficiency	0	1	1	0	1	1	1	1	1	0	0	1	1	0	1	0	1	0	1	1	0	0	1	1	1	0	1	0	0	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	
Response time	1	1	1	1	1	0	0	1	1	1	1	1	0	0	0	1	0	1	0	1	0	1	1	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Propositional Score	21	19	19	20	16	18	17	18	21	18	19	19	22	18	16	17	15	14	19	20	20	15	19	22	23	19	18	17	19	21	20	26	22	14	20	16	23	13	20										
Initiation of turn	1	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	1	1	1	0	1	0	1	1	0	1	0	1	0	1	1	0	1	1	0	1	1	0	0	1	1	0	0	1	
Time to start a turn	1	1	1	1	1	0	0	1	1	1	1	1	0	0	0	1	0	1	0	1	0	1	0	1	1	0	1	1	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Contingency of turn	1	0	0	0	1	1	0	0	1	0	1	0	0	1	1	1	0	0	1	0	1	0	0	1	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Prosody	0	1	1	1	0	1	1	0	1	1	0	1	1	0	0	0	0	0	1	0	1	0	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	
Mode of conversation	0	1	0	0	0	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Listeners or speakers mode	1	0	1	0	1	1	0	0	1	0	0	0	0	1	1	1	1	1	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Revision behaviors	1	0	1	1	0	0	1	1	1	1	1	1	1	0	1	1	1	0	0	1	1	1	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Use of self-repair	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Use of revisions	0	1	1	1	0	1	1	0	0	1	0	0	1	0	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Use of initiated repair	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Non Propositional Score	5	5	6	4	4	5	3	3	6	6	5	5	5	3	5	8	4	5	3	4	6	5	5	3	7	4	4	6	2	4	3	4	6	4	5	3	4	2	4										
Total Overall Score	26.	24	25	24	20	23	20	21	27	24	24	24	27	21	21	25	19	19	22	24	26	20	24																										

APPENDIX H – INDIVIDUAL SCORES OF 40 INDIVIDUALS WITH DEMENTIA – NARRATION DISCOURSE

Narration Discourse Parameters	Individual scores of 40 Individuals with Mild Dementia Mean Proposition, Mean Non Proposition and Discourse Score																																										
	1	0	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	0	0	1	1	0	0	1	1	1	0	0	1	1	1	0	0	1	1	0	0				
Discourse forethought	1	0	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	1	0	0	1	1	1	0	0	1	1	0	0					
Organizational Planning	0	0	1	0	0	0	0	1	0	1	0	1	0	0	0	0	1	0	0	0	0	1	0	1	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0				
Global coherence	0	1	1	1	0	1	0	0	1	0	0	0	1	0	0	1	0	1	0	1	1	0	1	0	1	1	0	1	0	1	0	1	1	0	1	1	0	1	0	1			
Local coherence	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	0	1	1	1	1	1	1	1	1	0	1	1	1	1	0	1	0	1	1	1	1	1	1				
Initiation of narration	1	1	1	1	1	1	0	1	1	0	0	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0			
Asks for assistance	0	1	0	0	1	0	0	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1			
Imagines events	1	0	1	1	0	0	1	1	0	0	0	0	0	1	0	0	1	1	1	0	1	1	1	0	0	0	0	1	0	0	1	1	1	0	1	1	1	0	0	0			
Introducing topic	0	0	1	1	1	1	1	0	0	1	0	1	1	0	0	0	1	1	1	1	1	1	0	0	1	0	1	1	0	0	0	1	1	1	1	1	1	0	0	1	0		
Topic shifts	1	1	0	1	1	1	1	1	0	0	1	1	1	1	1	1	0	1	1	1	1	1	0	0	1	1	1	1	1	1	0	1	1	0	1	1	0	0	1	0			
Topic changes	1	0	0	1	0	1	0	0	1	0	1	0	0	0	1	0	0	1	0	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0	1		
Perseverations	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Minimal elaborations	1	1	1	1	1	1	1	0	0	0	1	0	1	1	1	1	1	1	1	1	1	1	0	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	
Topic elaboration	1	1	1	1	1	0	1	0	0	0	1	1	1	0	1	1	1	1	1	0	1	0	0	0	1	1	1	0	1	1	1	1	1	1	0	1	0	0	0	0	1		
Information adequacy	1	1	0	1	1	1	1	1	0	1	1	0	1	1	1	1	0	1	1	1	1	1	0	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1		
Information content	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	1	1	1	1	1		
Message accuracy	1	0	1	1	0	1	0	1	0	1	1	1	0	0	1	0	1	1	0	1	0	1	0	1	1	1	0	0	1	0	1	1	0	1	0	1	0	1	0	1	1		
Temporal and causal relation (TCR)	0	1	0	0	1	0	0	0	0	1	0	0	0	1	0	1	0	0	1	0	0	1	0	1	0	0	0	1	0	1	0	0	1	0	0	1	0	0	1	0	0		
Vocabulary specificity	1	1	1	0	1	1	1	1	0	0	0	1	1	0	1	1	1	0	1	1	1	1	0	0	0	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	0	0	
Linguistic fluency	1	1	1	1	1	1	0	1	0	1	1	1	0	1	1	1	1	1	1	1	0	1	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	
Speech style	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Intonation	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Total Propositional	16	15	14	17	15	16	13	11	10	10	14	13	13	12	14	15	13	17	14	15	13	14	10	12	14	14	13	13	14	15	13	16	14	14	13	14	10	12	14				
Revision behavior	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Self-correction	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Repair through repetition	0	0	1	0	1	0	0	1	0	1	0	0	1	0	1	0	0	1	0	1	0	0	1	0	1	0	0	1	0	1	0	0	1	0	1	0	0	1	0	0	1	0	0
Initiated correction	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Request for clarification	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Non Propositional	1	0	1	1	1	1	0	1	1	1	1	0	1	1	1	1	0	1	1	1	1	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1		
Total	17	15	15	18	16	17	13	12	11	11	15	13	14	13	15	16	15	18	15	16	14	14	11	13	15	15	13	14	15	16	14	16	15	15	14	15	10	13	15				
Discourse score	31.	27.	27.	33.	29.	31.	24.	22.	20.	20.	27.	24.	25.	24.	27.	29.	24.	33.	27.	29.	25.	25.	20.	24.	27.	27.	24.	25.	27.	29.	25.	29.	27.	27.	25.	27.	18.	24.	27.				
	48	78	78	33	63	48	07	22	37	37	78	07	93	07	78	63	07	33	78	63	93	93	37	07	78	78	07	93	78	63	93	63	78	78	93	78	93	78	52	07	78		

